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Warren Specter

'GAMES NEED MORE EVIL!'
DEUS EX CREATOR SPEAKS OUT

PS3 IN PIECES!

**PULLED APART!
PHOTOS INSIDE**



EXPOSED: Why the Australian console does less but costs more...

OVERCLOCKING: A HISTORY

PART 1: FROM INTEL'S 8088 TO THE CORE 2 DUO

CHEAP MOBILE COMPUTING

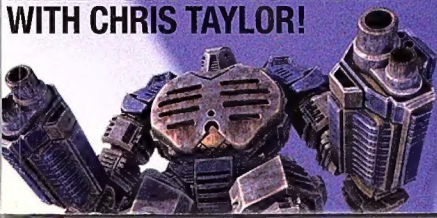
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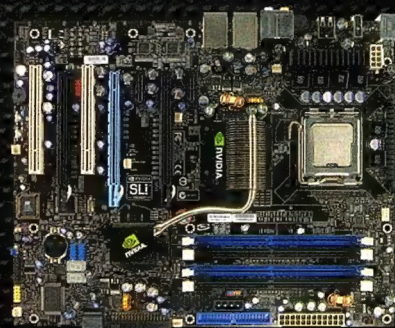
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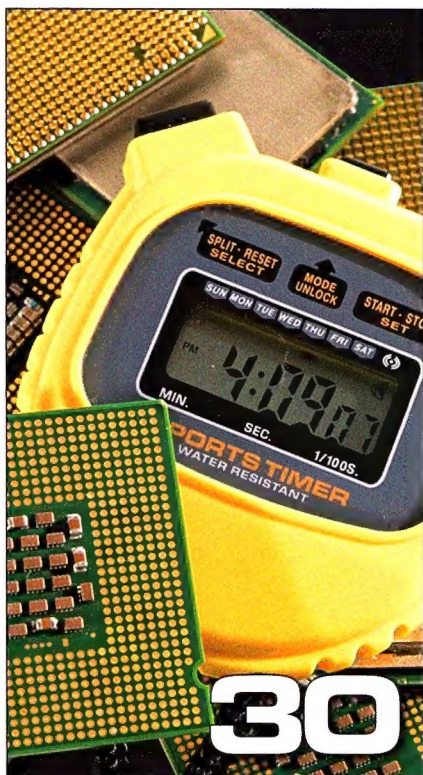
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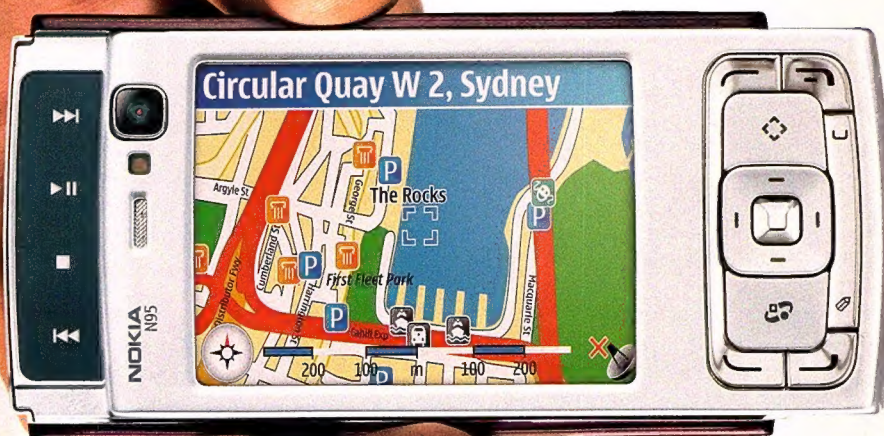
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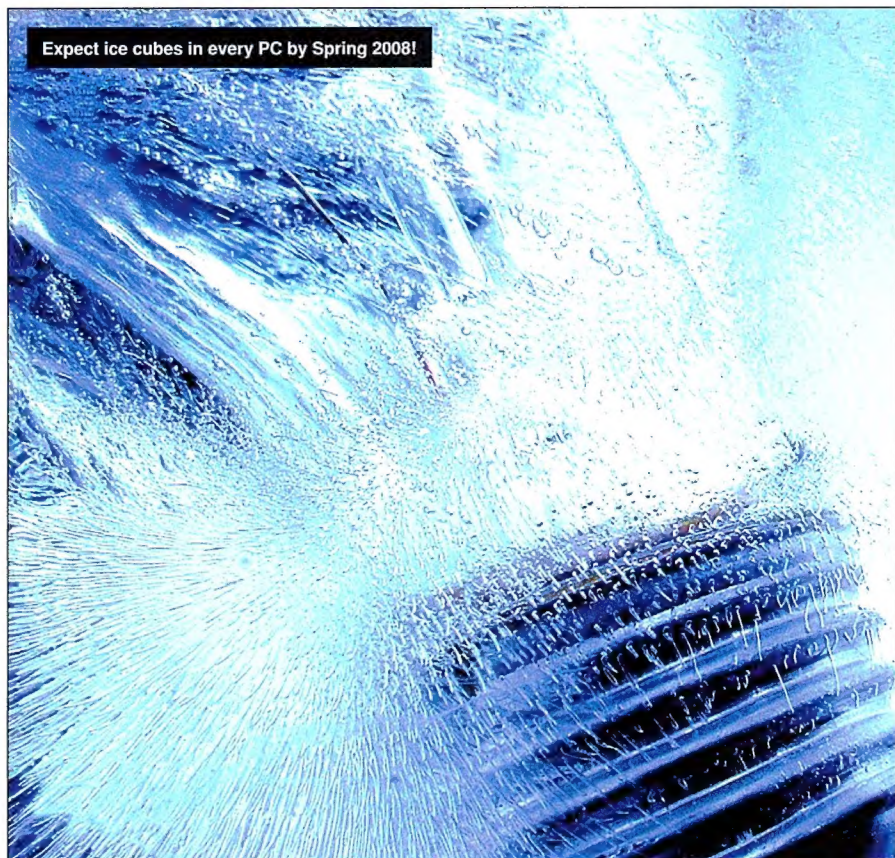
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TECHTRENDS

Quenching your thirst for the latest technology and hardware happenings

Expect ice cubes in every PC by Spring 2008!



Solid status

Craig Simms gets seriously hard... disks.

Solid state hard drives have finally hit the consumer level after many years of being too expensive. While it is certainly still expensive compared to traditional magnetic disk, these drives of well reputed crazy speeds are now in the realm of the accessible. Well, accessible for the demanding super performance connoisseur with deep pockets, anyway.

While Samsung and SanDisk have announced their 1.8" 32GB solid state drives, with some

leaking their way into notebooks, until now there's not been a desktop equivalent. The Samsung/SanDisk drives reportedly give between 50 and 65MB/s sustained and burst transfer, meaning while the magnetics win out on burst, on sustained the Solid State Devices (SSD) kick arse, so we'd love to see how the desktop drives go. Then again, we'd love one of the notebook drives just to test it ourselves, but circulation doesn't seem high.

The desktop offering in question has been made by memory firm Super Talent, who is giving us the full range of hard drives – 1.8", 2.5" and 3.5" – in seven different models and using the SATA interface and offering up to 128GB in the 3.5" model.

Of course there are four major benefits to solid state drives: access times, no seek times, no moving parts and, for notebooks, the key factor of considerably less power consumption, which according to Super Talent is a magnificent 85 percent less.

While we don't yet know the speeds of the desktop drives, Super Talent claims they are 'comparable' to their magnetic counterparts, thanks to the NAND flash technology used. We're reasonably certain the magnetic Western Digital Raptor is still safe as the performance king at this stage.

We also don't know the cost yet – but considering SanDisk's 32GB 1.8" goes for about \$440, we have a while yet before SSDs hit true consumer grade. Still, this is the dawn of a beautiful era – expect other players like Kingston and OCZ to join the crowd once prices drop and it becomes an accepted market – probably some time between 2008 and 2009. 

SHORT CIRCUITS

Viacom is pulling out the big guns to protect its content from the evil Interweb, as tends to be the case with media companies these days, and to get a piece of Google's fortune. Yep, YouTube is in the limelight again, and rather than be civil and understanding of the way of the Internet and trying to work something out, Viacom is choosing to sue to the tune of \$1.25bn and wants an injunction as well. What's amusing is Viacom is still bandying about the notion of being able to 'filter' copyrighted video content – failing to recognise this is a foolish and impossible task.

Todd Hollenshead of id Software has commented at the Game Developers Conference 2007 that piracy of its PC games has driven it to move to cross platform, while other developers move to consoles entirely to cut down on the losses. Certainly on a console a much more protected environment exists, and we can see why this would be attractive to developers.



Still on the piracy front, in a remarkable display of sense Microsoft group business president Jeff Raikes has said what we've suspected all along with Windows' popularity. 'If they're going to pirate somebody, we want it to be us rather than somebody else... We understand that in the long run the fundamental asset is the installed base of people who are using our products. What you hope to do over time is convert them to licensing the software.'

ASUS gets Creative

Craig Simms jumps onboard the motherboard sound revolution.

As the first big player to take on Creative in a long time, ASUS needs to be congratulated. At CeBit 07 in Hanover, Germany, it revealed its Xonar DX and Xonar DX2 cards, the latter hitting the PCI-E x1 form factor – a first for sound cards, and flying in the face of Creative's latency claims. ASUS plans to combat Creative on the driver front, which has always been its weak spot. Dolby Live, ProLogic II, DTS Connect/5.1, headphone and Virtual Speaker standards are available, and apparently it features a second processor capable of 'legally' ripping music to MP3 and WMA through a process called analogue loopback transfer. While 118dB SNR is supported in playback, 115dB SNR in recording, and Full Duplex HD audio (192KHz/24-bit) is touted. By comparison the X-Fi supports 116dB SNR on both recording and playback and up to 96KHz/24-bit sound. The ASUS card comes in sexy black with an EM shield.

We had figured the sound card market dead, but suddenly with all these Oxygen C-Media chip cards and ASUS entering the market, we're set for a reinvigoration. Dare we be hopeful?



NVIDIA spreads the DirectX 10 love

Shader Model 4 for all? 'Yes please!' says Craig Simms.

NVIDIA's mid-range 8 series cards should be with us soon – the 8600GT (540MHz core, 1400MHz 128-bit 128/256MB GDDR3 memory, HDCP support optional, no external power required), 8600GTS (675MHz core, 2000MHz 128-bit 256MB GDDR3 memory, HDCP supported, one PCI-E connector) and 8500GT (450MHz core, 800MHz 256MB GDDR2 memory) are lined up in the pipe and



ready to go. It seems add-in board partners will have to supply their own HDCP key EEPROMs, so make sure your card fully supports HDCP before purchasing. Both 8600s will support SLI, while the 8500 will not.

Release time is set to coincide with ATI's RADEON X2k family. We get the feeling no matter what ATI throws at us in the coming months, NVIDIA will be all over it for this generation, the 8900GTX lined up to pound the X2900XTX whenever it arrives.



Creative has released a 'final' Vista driver for its X-Fi. In typical Creative fashion, the following do not work: Decoding of Dolby Digital/DTS, DVD-Audio, DirectSound-based

EAX games, 6.1 speaker mode, S/PDIF pass-through in 64-bit Vista, and any applications on the original X-Fi CD. Good to know it cares.

Corsair has demonstrated DDR3 memory at CeBit this year. Running at 1066MHz, it operates at a CAS latency of six – it's looking like we'll be making the mistakes of DDR2 all over again. An 800MHz part was also demonstrated, with 1333MHz parts running in labs and 1600MHz parts available soon. Of course, first we need a publicly available chipset to support it...

FUTUREPROOF

Gazing into the crystal ball of tech

Intel throws its toys out of the PRAM

Intel announced it will be mass producing phase change memory by year's end. The IT industry loves acronyms, so it's known as PCM (Phase Change Memory) or PRAM.

Like magnetic RAM (MRAM), PRAM is another contender to the flash crown. While flash is good for 10,000 to 100,000 writes depending on the product, PRAM is good for 100 million cycles, and more than 10 years data retention when kept at a crazy 85°C. It's hoped it can take on DRAM and become the standard system memory in PCs.

PRAM works by using chalcogenide glass, allowing the user to change the state from crystalline to amorphous through the application of heat, then measuring that state to determine a '0' or '1'. The amorphous state is a high resistance state, and is usually used to represent a '0', the low resistance crystalline a '1'. This is similar in idea to RW optical discs, except RWs use the state's optical properties rather than resistance values to determine the dataset. This process is now claimed to take less than 5ns.

Intel licensed the PCM tech from Ovonyx Inc, and is co-developing with STM. Intel first invested in February 2000 and it's just starting to bear fruit now.



POST OF THE MONTH

Oh, we have had some crackers this month. Whether in the Green Room or in tech, the Atomic forums have really been buzzing with quality of late. If you haven't already, we highly recommend checking out the wonderful, funny and clever posts on the Atomic forums.

But in the end we just had to give it to a post that glorifies the hardcore tech of Atomic. Leonid compiled and customised code that's just beautiful to look at. Even though we don't understand a word of it we've been reliably informed it's a top job!

POTM:

Leonid's How to build an anti-Spam and anti-Virus Mail Relay for Exchange 2000/2003/2007

www.atomicmpc.com.au/forums.asp?s=2&c=16&t=4316

Nice one Leonid. That's one sexy Logitech mouse coming your way!

Every Post of the Month wins a fabulous Logitech mouse from the brilliant people from Logitech... Huzzah!!!!



SCANNER

Game, industry and
line news for the
enthusiast



Engines of creation

The battle of next-gen graphics engines has begun. Logan Booker reports from the frontlines.

With the Xbox 360 and PS3 now globally available, and DirectX 10-capable graphics cards with unified shader architectures available for PC, the next-gen engine war has started. Not that it's much of a war, with Epic's Unreal Engine 3 dominating the industry. The list of developers that have licensed the engine is already lengthy, including BioShock, Frontlines: Fuel of War, Huxley, Stargate Worlds, Mass Effect and, as of late February, an unknown title from Capcom Entertainment.

It should be noted that while the technology behind these engines has existed for some time, the main barrier to its uptake has been performance. Now, with the optimised Shader Model 4.0, DX 10's geometry shader, the prevalence of multi-core processors in PCs and consoles and, most importantly, dynamic programmable shader units (otherwise known as stream processors), new effects can be achieved without killing the frame rate.

As we've mentioned, UE3 has made the biggest impression on the industry, and is being

used in everything from first person shooters to RPGs and MMOs. Its popularity would largely be due to familiarity with the tools thanks to the legacy of Unreal Engine 2.

Of course, there's also the graphics. Gears of War showcased the power of UE3, including its excellent performance despite premiering on

“Valve's Source still has bits and pieces in it from the original Quake code...”

the Xbox 360. It's unknown whether Epic used all three CPUs in the console (an early report of the game during beta stated it was only using one), so we can't really assess its scalability.

UE3 has also been built from the ground up to support dynamic lighting, materials, high dynamic range effects and sexy particles – it was designed for next-gen hardware.

Following far behind UE3 is Valve's Source, an engine that still has bits and pieces in it from the original Quake code, according to id's John Carmack. This hasn't stopped Valve from ramping the dickens out of its technology and the next instalment to Half-Life 2 will see the engine support dynamic lighting, self-shadowing, multi-threading and various 'cinematic' effects. Even with these updates, Source isn't the most appealing option to developers, with a majority of interest coming from the modding community. Again, while we can only speculate about Source's commercial popularity, it appears the engine is primarily designed with the PC in mind, and was not built with a focus on next-gen consoles. Instead, Valve is retrofitting the rendering pipeline to bring it up to date.

On the sidelines are Crytek's CryEngine2 and Offset's self-titled engine. CryEngine2 was recently licensed by Avatar Reality, an online gaming-focused developer looking to make what it calls a 'massively multiplayer virtual world' or MMVW. According to the press release announcing the deal, the game will be set on a terraformed version of Mars.

The Offset Engine has also appealed to the online crowd, and last year was picked up by Red 5 Studios, a company headed by a number of ex-Blizzard employees.

Of course, id Software is due to release

another game (or technology demo, depending on cynicism levels) in the next year or so, and it's probable that it will be the last engine id will pump out. In a 2004 interview with CNNMoney's Chris Morris, it was made clear that Carmack's interests have changed and that beyond one more engine, he couldn't make any guarantees about the future. 

SHORT CIRCUITS

Just when you thought the original Half-Life was dead – well, in Valve's mind at least – the developer has released an update to its ancient first-person shooter. The only significant change in the patch is to allow resolutions up to 2560 x 1600, so if you're one of those lucky bastards with a 30" screen you can now *really* enjoy HL.

Microsoft has tentatively dated Flight Simulator X: Adrenaline, the first expansion to its latest flight sim title, for a release early in the second half of the



year. Players can not only expect more aircraft and missions, but a new 'air racing' multiplayer mode. Adrenaline should also include the highly-anticipated DirectX 10 patch, which should improve the game's performance and visuals under Vista. The

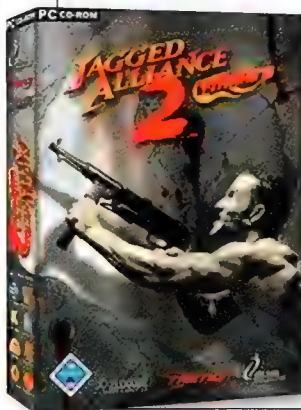
DX 10 patch will also be released as a free downloadable update at the same time as Adrenaline.

Bioware's once Xbox-only action RPG Jade Empire is now available on PC. Titled 'Jade Empire: Special Edition', the game is not a direct port and features PC enhancements in the form of customisable controls; support for high resolutions and improved special effects; new enemies and fighting styles and better AI. If you're a big fan and own a PC, it sounds like it'll be a worthwhile purchase.

Jagged Alliance: The Movie?

Logan Booker doubts Strategy First has enough action points to pull it off.

Strategy First recently announced that it plans to produce a film based on the popular turn-based tactical game Jagged Alliance, with the help of Union Entertainment, a joint game/film production company. Producer Nick Nunziata will steer the creation of the flick, according to a press release from SFI.



We would love to say the idea is good, sane or even that it had a chance of coming to fruition, but the fates are vigorously against it. For one, naming a producer that has yet to produce anything, short of a horror flick with

'Brody the bear' as a main character and a sci-fi movie that features a 'Carcharodon Megalodon, the 70-foot, 40-ton prehistoric cousin of the great white shark', as detailed by IMDb.com, does little to guarantee a hit. There's also the issue of putting faith into a production company that has anything to do with Nickelback.

Even ignoring the film's producer of dubious ability or its production company with questionable musical taste, SFI's past record with the JA property isn't glorious. When it tried to get JA3, and a spin-off called JA3D, developed by independent studio Games Factory Inc, it was forced to cancel the game and revoke all licenses the studio held for JA. The last we heard, SFI was bringing production of the game in-house. Since then, we've seen no new screenshots or information. Perhaps finish the game first and then worry about the film?

Just a thought.

Games for Microsoft

It wants the games, it does, writes Logan Booker.

Microsoft continues to viciously promote its gaming IDE, XNA Studio, and this time round it's with a 'create a game' competition.

Using XNA Studio Express, a free download from Microsoft, entrants must design a playable game before the 2 June 2007 deadline. According to the competition website (www.dreambuildplay.com), each game will be scored in three categories: innovation, fun factor and production quality, with each category making up 40%, 40% and 20% of the final score, respectively.

If you'd like to check it out, be sure to visit the website. Note that you must be aged 16 or over to enter.



Jade Empire: SE may or may not come with a full-size fighting minx

If you're playing Sony Online Entertainment's MMOFPS PlanetSide, then

you might like to know that the company has upped the monthly subscription fee from US\$12.99 to US\$14.99. Not exactly bank-busting, but you will be paying an additional US\$24 a year... for what?

A multiplayer version of Darwinia? Can't think of anything we'd like more, other than a steam tent packed full of Scandinavian honeys. Developer Introversion has announced that it is developing just this (the game, not the tent) and will include new features, such as formations, and improved graphics over the original.

PIPELINE Hot games to watch out for



Warhammer 40K MMO on the way

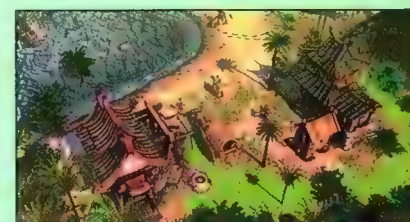
Release date TBA

There's absolutely no information available on this title, except for a brief developer interview scant on details. But there's no way we could pass this by without letting you guys know, even when there's not much to say.

Relic has secured the rights to make a Warhammer 40K MMO. Not to be confused with Mythic's Warhammer Online, which is set in the Warhammer Fantasy world, there is little information as to what form Relic's version will take. Given the company's history in the strategy genre with Company of Heroes, Homeworld, and of course, Dawn of War, we could be looking at a hybrid MMO/ strategy game.

What we do know is that for Games Workshop fans, the MMO landscape is looking extremely tasty with not one, but two games to choose from.

Platform PC
Publisher THQ
Web www.relic.com



Empire Earth III

Release date September 2007

We'll say, straight up, that we weren't exactly fans of Empire Earth II, thanks mostly to a woeful interface. After looking at the media screenshots of the third outing and noting a lack of interface shots, we can only pray that the same fate won't befall it.

Optimism comes in the form of sparkly features, of which EEIII looks to have quite a few. EEIII will play out in a persistent world - that is, as you conquer different lands, they'll stay conquered, allowing you to improve and reinforce them. According to the game's website, 60 separate maps will make up the surface of Earth.

As with previous installments, races can be fully customised, down to the units they can build and the economic/military bonuses they receive.

Even with all this, EEIII will have to face off against the recently released Supreme Commander and C&C 3.

Platform PC
Publisher Vivendi/Sierra
Web www.empireearth.com

ATOMICCHAT

Talking to the finest human beings on earth...

Warren Spector scored his biggest hit to date with *Deus Ex*, then promptly walked away from the developer.



Warren Spector

The guy's worked on *Ultima Underworld* and was behind the acclaimed *Deus Ex*. Alexander Gambotto-Burke talks with one of the top guns in the computer RPG world.

atomic How would you define the role of a game designer?

Warren Spector A game designer is someone who creates the structure and skeleton of an experience that players go on to complete. What makes games – and thus game design – different from other media is that they don't just allow collaboration with users, viewers, readers, or 'experiencers'; they require participation. If the player doesn't actively participate, nothing happens. There's no game. There's no experience. So, back to your question, it's someone who creates the tools necessary for someone else to come along and complete the experience.

atomic What do you feel is the true purpose of a game?

Warren Spector Well, I think fun is one part of what makes games worth playing and making, but my issue is when it becomes the only value; the only thing that games can be about or should be about.

I think games are about experience; they're about letting people try things out, testing behaviours, interacting with other people – even if they're just virtual. We can be about more than just fun. I think that's an accurate statement of my position on that.

atomic What exactly do you mean by 'testing behaviours'?

Warren Spector Well, it's not like there's usually a right and wrong in the world! There are shades of grey if you're a thinking human being. And games can let us explore that world of grey in a safe environment. Also, testing ethics – we can allow people to challenge their ethical and

intellectual beliefs. We don't do that very often, but we can, and I think we should.

atomic So, do you believe the opportunities to explore this kind of territory are being squandered?

Warren Spector Absolutely. The fact that most players don't demand it, and most developers don't deliver it... it's not terribly surprising. There's a lot of money being made in games that don't get into ethical dilemmas: you're rewarded for stealing that car; you're patted on the back for killing that guy. It's just all sort of fun and games, which, to my mind, makes it kids' stuff. So I absolutely think the opportunities are being squandered. Having said that, there are plenty of people now who are exploring that interesting 'What does it mean to be human?' territory.

atomic Any examples come to mind?

Warren Spector Oh, the BioWare guys do it all the time! I like to think we do it at Junction Point. At Origin, we did it all the time – Richard Garriott was all about that. Wasn't it *Ultima IV* that had the kids who were caged up, and they were being tormented by an adult, but if you let them out, they pounced on you? There was a lot of, 'What's the right thing to do in this situation?' It has nothing to do with getting points or rewards. It has to do with what you believe as a human being. Looking Glass did that all the time; at Ion Storm, we tried to do it.

atomic Working on the *Ultima* games also apparently inspired you to create emergent gameplay in the future...

Warren Spector Definitely. We tried to make sure there were a variety of ways to solve all of the puzzles in the game, and there was one we just couldn't think of an alternate solution to. There was this portcullis – a gate that dropped down from the ceiling, which of course you



“ Games can let us explore the grey areas... we can allow people to challenge their ethical and intellectual beliefs. ”

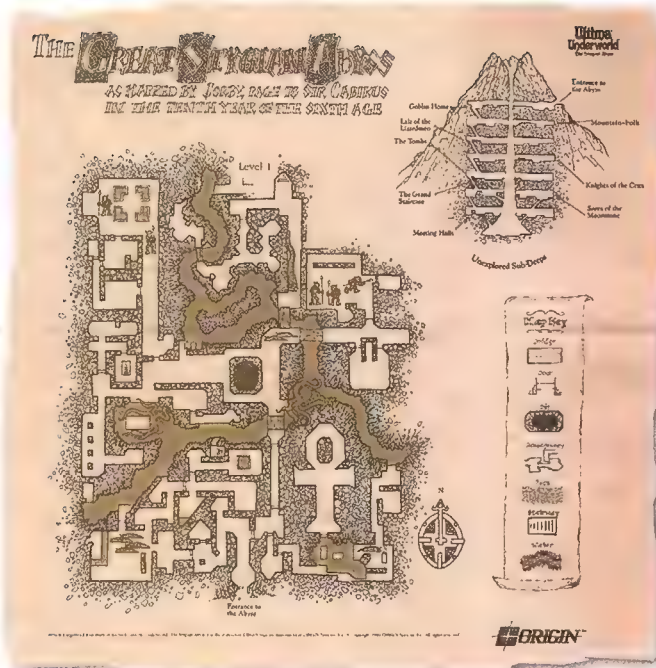
couldn't see, because it was a top-down game. The portcullis would fall, and you'd be on one side. We knew you were going to be on that side – on the other side, there was a lever you needed to flip in order to get past. We said, 'OK, by this point, the player has to have the telekinesis spell, and he'll stand on one side, he'll use telekinesis on the lever, and then he'll continue moving on.' I watched one of the testers play that part of the game, but this guy didn't have the telekinesis spell. So I'm sitting there, chortling to myself, thinking, 'There's no way he can succeed!' It turned out there was a character you could have in your party called Sherry the Mouse – who was in fact a mouse – and the physical simulation of the portcullis was robust enough that it actually allowed Sherry to go under the bars, because she was small enough. And that guy went on without using telekinesis. I literally fell on the floor; I laughed so hard. I was amazed.

atomic How do you feel when you see that sort of thing in your games?

Warren Spector I feel like we've succeeded; I feel like we've done something more than just

put the player on a rollercoaster ride. That guy solved a problem – he came up with a creative solution to a problem; it wasn't pre-planned, it wasn't anything we knew was going to happen, and he did something that no-one else in the world, as far as I know, had done. Players exercising their creativity to solve problems in the service of a larger story, making the story completely their own – there is nothing in the world cooler than that! There's no movie, there's no book, there's nothing more powerful than that!

atomic Finally, why did you end up leaving Ion Storm, where you developed arguably the most famous game of your career, *Deus Ex*?



▲ Maps come in very handy when you have to navigate through a world as treacherous as *Ultima Underworld's*.

Warren Spector I left for a variety of reasons. I was kind of burned out at the end of *Deus Ex* on being so immersed in a game, and I had allowed myself to go so far from the actual hands-on creation of the games, and I wasn't having a good time any more. And there was a studio of 90 plus people that was about to get even bigger, and have lots of talent with expectations and roles that would make it harder for me to get back in touch with the game itself.

Everything looks black and white when staring down the barrel of JC Denton's gun, but *Deus Ex's* executive producer likes the grey areas.





Jeremy Soule

He's composed music for such massive games as *Total Annihilation*, *Knights of the Old Republic*, *Oblivion* and *Supreme Commander*. Logan Booker wanted a song.

atomic What first interested you about music? When did it become a career?

Jeremy Soule I really never thought of music as being my career until I started working at SquareSoft at 19 years of age. It seemed too good to be true. My first game was for the SNES called *Secret of Evermore* and it was a challenge to make that hardware sound musical. I'm still not sure how my friend Nobuo Uematsu was able to get the *Final Fantasy* scores to sound so amazing while I struggled to get the machine to make a sound. He had the magic touch.

atomic How did you get into creating music for games? Have you always had an interest in gaming?

Jeremy Soule I always have loved video games. I knew that as computers became more powerful, it would only be a matter of time before

lush virtual worlds would lure people away from movies and television. I routinely played video games to take the pressure away from my studies as a composer during my childhood. I attended university and high school at the same time so I didn't have a lot of time for myself. Between eight hours of composition homework and high school, I still managed to squeeze in a few hours a week on my SNES or Genesis. I loved and adored *Zelda*, *Metroid* and the *Final Fantasy* games. I couldn't stop being amazed at Koji Kondo's work and that of Uematsu-san. I was also a huge fan of Yuzo Koshiro. To this day, these composers are on my list of who I admire.

atomic How difficult is it to create an original piece of music? How do you go about it?

Jeremy Soule Creativity is a mysterious force.

For me, creating music is something I've done since my toddler days. It takes effort and energy to bring a piece of music to life, yet I never feel like I 'wrote' the piece. I hear music in my head much like a radio program and I end up writing down what I hear. I don't feel effort in putting notes together. Instead, I labour over transcribing this invisible music so that others can hear what I'm hearing. I constantly 'hear' music. My life is a soundtrack and I don't suppose I'll ever be able to write down everything that my imagination sends my way.

atomic How does composing music for a game differ from other types of composing?

Jeremy Soule Composing for a game requires special attention to texture. I often have to compose with very controlled textures so that the ear is not distracted away from gameplay. I have to consider gameplay conditions when I determine what emotions I want to enhance in the storyline. Composing for games is definitely more three-dimensional than composing for a film as you have the interactive elements dictating things such as pace and density.

atomic What challenges do you face when working with a game developer on a title?

Jeremy Soule The challenge is to create music that fits the pacing and the mood of a game like clockwork. The first few sketches I make for a game allow the designers to get a feel for what direction I'm heading. Once we both arrive on a solid set of sketches, I'll usually create a music design spec. This is what is involved for tracking and sequencing a music production for a game. There are many things that can skew a design to the point where I'm rewriting material for certain scenes due to technical limitations that arise or scheduling issues. It takes patience. The best I can do for my designers is to listen to them. Most people have good musical instincts. If there's anything I can do to enhance the designers' vision for a game, then I'm willing to experiment and try things that push the design spec. As a composer, I'm expected to have a mastery of music that is flexible enough to enable a designer to accomplish his or her goals for an experience.

atomic How long would you say on average does it take to create a complete score?

Jeremy Soule A score can take a year or more. *Oblivion* took nearly a year. It all depends on

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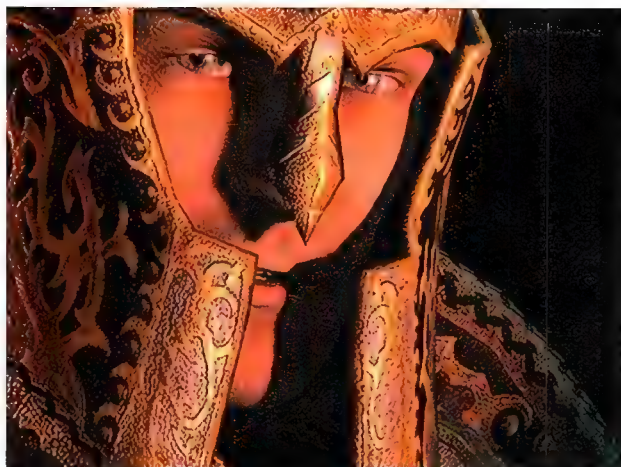
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▲ Oblivion's score took almost a year to write.

how much time I have. If I have three months, as in the case of *Prey*, then I'm going to use three months as wisely as I can. If I have more time, such as was the case with *Supreme Commander*, then I'm going to write in styles that can be accomplished with the extra time. A single piece of music can take an hour or a week... or even months. There is not a set formula for how long a piece of music takes to create.

atomic What would you say thus far has been the most challenging game to compose for?

Jeremy Soule Every game is challenging to me in some way. *Star Wars* and *Harry Potter* had challenges because of the expectation that John Williams created in the ears of the fans of these franchises. I think games like *SOCOM* or *Company of Heroes* made me ponder the inner emotions of danger in a different way than something that is more in a fantasy vein, such as *Warhammer: Mark of Chaos*. Ethnic games such as *Guild Wars: Factions* or *Prey* also had their challenges. I had to learn about indigenous instruments and how to make them work in the context of an orchestral setting.

atomic What materials does a game developer provide you with to help create scores for certain areas, stages in the game, character themes, etc? What sort of info really helps you?

Jeremy Soule I love visual information. Animatics, storyboard sketches, character concepts and in-game graphics are all essential to me. I like to have a master game design document at some point. Simply talking and spending time with the team members of a project is also a requirement. I try to absorb as much as I can about a game and from [that] [I can] create a solid base of information.

atomic How has the advance of sound technology in computer games, such as 3D positional audio and the move from MIDI to MP3 affected your methods/approach?

Jeremy Soule I can actually write real music! It was so difficult to make 8-bit sound chip technology have any sort of emotional value

whatsoever. Now, I can work with the London Philharmonia or Seattle Symphony to accomplish some amazing things. My synthesiser studio is also quite flexible and powerful. I really can create pretty much whatever I want in digital 24-bit audio these days. Games are on par with feature films in terms of the surround capability and signal quality. I think that most post-production houses in film use the same tools as we use for games.

atomic Total

Annihilation was probably one of the first games to be noticed not only for its gameplay but also its powerful orchestral score. How does it feel when someone who traditionally wouldn't notice this, like a gamer, does?

Jeremy Soule I like to make gamers happy. It always makes me smile when my music, or anyone else's in this industry, gets noticed in a good way. Every developer I know wants to contribute to something better for our industry.

atomic What can you tell us of your more recent projects, like *Supreme Commander* and *Prey*? How would you say your methods and style have changed over the years, and from game to game? What have you learned about music in games?

Jeremy Soule I've learned that you can't take scenes for granted. Games need to address music in a comprehensive way. *Prey* had three hours of music. We found

that the game demanded that kind of intensity in the spotting stages. The original *Prey* spec was 45 minutes. When 3D Realms brought me on board to replace the existing score, I knew I had an enormous task on my hands. With *Supreme Commander*, I had to follow on with styles I had written from my days in *Total Annihilation*. It was like revisiting my past.

atomic Is it true that you created the name of the game *Secret of Evermore*? Can you confirm if this is a rumour or fact?

Jeremy Soule I have to admit that it is true. I wrote the word 'Evermore' on a whiteboard in the design room when no one was around. I just thought it was a cool word and I used it as a sort of verbal cue for my music. It was the management's decision to name the game *Secret of Evermore*. That caught me by surprise. To this day, I don't think anyone at SquareSoft knows that I was involved with SoE's name.

atomic Did you have a chance to look at Cavedog's cancelled *Amen: The Awakening* while you worked on the score? Can you tell us anything about this title?

Jeremy Soule *Amen* was an incredible game. I really think Greg MacMartin is an amazing designer. He also worked on *Harry Potter* and the *Chamber of Secrets* (PC) which I believe was one of the best selling of the series. Of course, his work on *Amen* and *Harry Potter* couldn't be more different. I just hope *Amen* can be resurrected someday. I wrote an entire score for it that is lying dormant at the moment. ☺





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Virtuality

Virtualisation is nothing new, but what is new is just how cool it's become. Ashton Mills explores the state of play.

The concept of virtualising hardware to run multiple operating systems or applications on a single platform has been with us for almost fifty years now. It was, back then, the exclusive domain of IBM and its System/360 mainframes. It's only been in the last decade that ubiquitous desktop systems have had the power and functionality to handle it efficiently, and as a result we've seen a growth in virtualisation software.

While certainly not the first, virtualisation achieved mainstream recognition when VMware released its first product for Linux almost ten years ago that allowed it to run Linux and Windows as *guest operating systems* on a virtual machine. Later, VMware would release a version for Windows and it quickly became popular for software development, sandboxing, and for enthusiasts (including us) to run multiple operating systems at the same time.

Today virtualisation software has come a long way, and there are a plethora of products to choose from. Traditionally virtualisation has always been a largely software affair, sometimes with some brilliant trickery to run multiple operating systems fast and efficiently. Recently, however, with both Intel's and AMD's support for *hardware virtualisation* through the Intel VT (aka Vanderpool) and AMD-V (aka Pacifica) technologies respectively, virtualisation has entered a new age.

Join us as we explore it and its multiple and rather colourful facets.

Hyperwhat?

One of the new fangled terms you've probably heard recently relating to virtualisation is *hypervisor*, but the word is over four decades old. When IBM had the foresight to develop virtualisation in the 1960s for its Model 67 System/360 mainframes, operating systems were known as *supervisors*, and any virtualised guest operating systems were *hypervisors*.

Today the term hypervisor is used to represent the abstraction layer that sits between the hardware and operating system. It allows any operating system to run on the hardware without any knowledge of the hardware itself. The previously mentioned Vanderpool and Pacifica technologies take this a step further and allow the hypervisor to

access hardware directly in order to accelerate virtualisation for guest operating systems. In fact, a hypervisor is required to take advantage of Intel VT and AMD-V.

Virtual machines

Naturally, virtualisation is a big topic, and there are a number of levels and implementations. But the key ones are as follows:

Full emulation

As the name suggests, this is where a complete hardware environment is emulated by the virtual machine in software. The advantage of full emulation is that pretty much anything will run in it – so you can, for example, run a PowerPC operating system on an x86 machine. The disadvantage of full emulation is that it's a lot of work to emulate a complete environment, and so it's extremely slow.

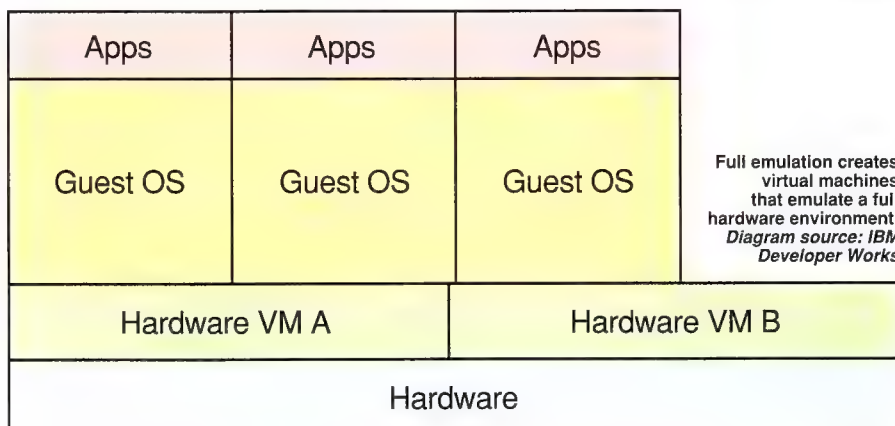
Examples of full emulation virtual machines include BOCHS and QEMU under Linux.

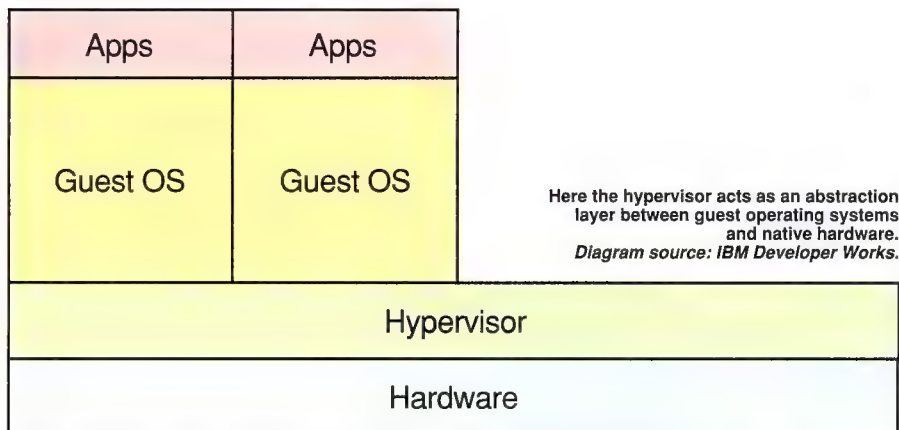
Full virtualisation

Full virtualisation takes a different tack – instead of emulating a complete machine, why not emulate only what an operating system expects to find? And so this is exactly what it does. Essential components like video, disk, memory and various devices like networks are all virtualised, but no more than are necessary.

The advantage of this is that it's considerably faster than full emulation, as only some functions need to be virtualised. The disadvantage is that the guest operating systems need to be of the same platform to run. So, for example, you can run an x86 version of Linux on an x86 platform, but you can't run it on a PowerPC system.

Full virtualisation is where hypervisors come into play, acting as an abstraction layer for key hardware resources. And recently with Intel VT and AMD-V, hypervisors can now allow guest operating systems to make mediated direct hardware calls, accelerating virtualisation even further. The use of





this is becoming commonly known as *Native Virtualisation*, given the direct access to the native underlying hardware.

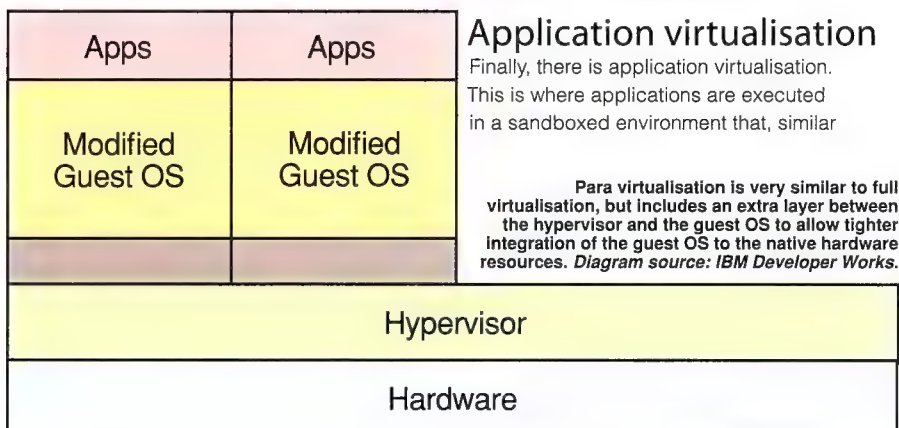
Examples of full or native virtualisation software includes VMWare, Win4Lin, Mac-On-Linux, and Microsoft's Virtual PC.

Para virtualisation

This is the most interesting and newest approach. It takes full virtualisation a step further and directly ties guest operating systems to the host operating system through dedicated libraries and APIs, essentially making them 'virtualisation aware'.

The advantage of this method is that it provides even greater integration through the hypervisor to the host's resources and results in near-native performance for guest operating systems – more than what full virtualisation can provide. The disadvantage is that both host and guest operating systems need to be specifically tailored to work with it. This means you can't, for example, install the latest whiz-bang operating system until it has specific hooks coded for it, which may never happen if it's closed source.

Examples here include Xen and the latest versions of VMWare and Win4Lin.



KERNEL VIRTUAL MACHINE

KVM (kernel virtual machine) is an interesting twist on virtualisation in the new Linux 2.6.20 kernel that essentially turns the kernel into a hypervisor, and through the addition of a special kernel module and a modified form of QEMU allows guest operating systems to run like any other user-space process. For example, you might run Firefox and Windows XP side by side just like any other applications on your Linux desktop, with the latter interfacing through the kernel hypervisor.

to native virtualisation, emulates only the required environment the application needs to see – so a virtualised IE instance might have its own registry entries, memory pool, and even directories to write to which all exist in a virtualised container, but no access to the underlying operating system itself. So if that IE should get infected by malware, it can't go anywhere outside the limits of the virtualised container, and closing the instance kills everything within it.

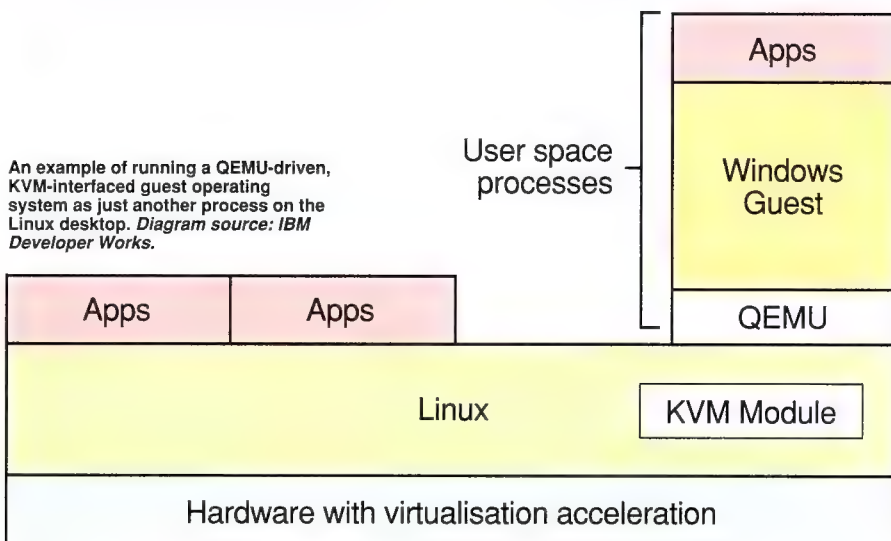
Application virtualisation is only really coming of age now, and promises in future to allow you, for example, to always run a browser within a virtualised container and thereby completely safeguarding your machine through its compartmentalised environment.

So what's it used for?

Virtualisation has many benefits – different servers, even running different operating systems, can be consolidated onto a single machine. Multiple server applications can be run within contained environments on a single server. Operating system images can be distributed over networks, or brought up and down easily without affecting other software on a system. Applications or entire operating systems can be sandboxed for protection. Software development can test cross-platform applications on a single computer. Hardware developers can test firmwares on products that haven't been produced yet. And we're just scratching the surface of how virtualisation is being used today.

And then there's the enthusiasts, people like us. If you currently dual boot Windows and Linux – and a lot do these days – consider this: you no longer need to. With Intel VT and AMD-V, the software is available right now for you to run Windows on Linux or vice versa at the same time, so close to native speed you won't be able to tell the difference. Especially with dual-core CPUs where each can get a dedicated core. Give them full screen displays, and you can literally run two completely different operating systems simultaneously at full speed on your system right in front of you. It doesn't get any cooler than that.

An example of running a QEMU-driven, KVM-interfaced guest operating system as just another process on the Linux desktop. *Diagram source: IBM Developer Works.*





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A step backwards

Ashton Mills wants Windows with a view. A useable one.

Now I generally like to give an operating system the benefit of the doubt because, let's face it, they are some of the most complex beasts in computer science.

But Vista, for the first time, is changing that for me. Every Windows release has been better than the last. Growing pains aside, each has been a big step forward.

Except Vista. Having used it through beta testing and now the final RTM for a number of months, I found myself recently wanting to remove it and re-install XP. Which is a first – I've never wanted to *revert* to a previous version.

Let's be sure – Vista has a number of significant benefits, including better memory management, stability, security, features such as DirectX 10 (well, when we see it getting used), and of course the interface.

Ah, the interface. The centrepiece of the 'WOW starts NOW' campaign – but unfortunately the WOW has worn off now, and it doesn't help me get my work done or be more productive. In fact, it's been hindering it.

It's not too dissimilar a story to Windows 95-XP – to obtain the perception of a slick, responsive interface Microsoft allowed video drivers to run in Ring 0, the most privileged of execution levels, which meant that when something display-related crashed, it brought the whole system down with it. By comparison, display drivers and the X Window system under Linux have always been somewhat slower, but also aren't allowed to run at Ring 0, so that when a program misbehaves it doesn't kill the entire system. It's no surprise that part of the graphical overhaul in Vista – and what's caused everyone so much hassle with video drivers – has been to rip this out to the user-mode rings (1-3, though Windows just uses 3) where it should have been in the first place. It's ironic that Vista's 'revolutionary' overhaul is just to bring it up to speed to Linux.

Despite this, Vista yet again puts aesthetics above functionality. The 3D acceleration and effects are pretty, but it hides a deeply flawed user interface paradigm.

“I can't handle working with an interface design that slows me down...”



We first looked at the possible faults in the interface back in issue 57 with our preview on Vista. Back then, we said that it held promise but that it was over-complicated, and in dire need of a KISS (Keep It Simple Stupid) approach. Well, Microsoft didn't listen.

I can put up with the obscure crashes, the slow file copying, the sidebar bleeding through into games, the three levels of delete confirmation for

overwriting, the debateable crumbed navigation, UAC, the lack of good video drivers and SLI (yes, this is partly NVIDIA's fault), broken applications and the lack of UI consistency in dialogs that still exists after all these years. I can handle all that, but I can't handle working with an interface design that slows me down.

For me, just one of many examples are the folder views – despite setting them up how I want, Vista will regularly think it knows best and display a folder based on the content of a directory, even if I don't want or need it to. Many directories I work with contain a variety of file types, and Vista will seemingly present a different view every time. There was, to be sure, nothing wrong with how it was handled in XP but again Microsoft goes in for fluff in lieu of functionality.

At the end of the day it doesn't matter what the reasons are, or what's under the hood, or anything else. All that matters is the experience the user is left with – this is the measure of a product's success. And for me, after months of Vista, with the WOW gone I find myself frustrated with it, annoyed by it, and with the desire to uninstall it. Considering the key to success for any business is to build and retain customers, Vista is failing, and I know I'm not alone. I think Microsoft has lost the plot on this one, and Vista is the first version of Windows that's taken a step back.

Whatever you do, don't get in Ashton's way.

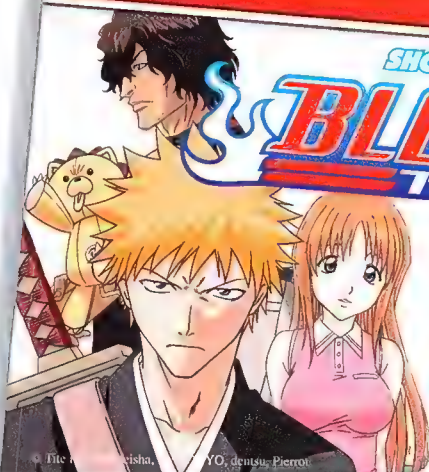
He can kill a man with a stare.

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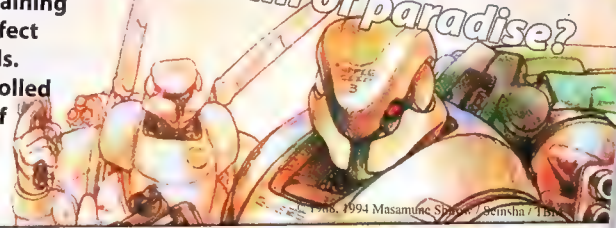
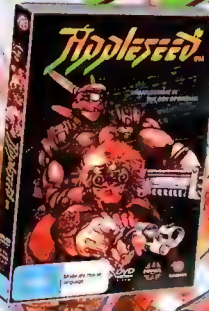
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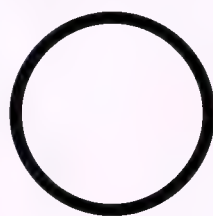
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PLAY DAY

Logan Booker ventures into the soul of Sony's PlayStation 3. Is it a supercomputer? How about a PC replacement? Or even just a games console? Time for some answers.



n 23 March 2007, the PlayStation 3 finally reached Australian shores. It didn't exactly wash up on the beaches of Bondi in a sleek brushed aluminium crate or parachute drop into the centre of Sydney via C-5 Galaxy, but it did get here by more mundane, and slightly less insane, means.

The fact remains however that despite its technological ferocity, the PS3 is late. We went from a guaranteed global launch in November 2006 to a US/Japan only release with Europe, Australia and New Zealand shoved into the scary unknown of

2007. The more desperate PAL gamers who had banked on satiating their need for Sony's high-tech games machine in November may have turned to eBay and shelled out exorbitant amounts of cash for an NTSC PS3. Others may have simply cradled their PS2 and wept silent tears until the crushing sadness abated. A few just accepted the fact that products get delayed, and went out and bought an Xbox 360 or Wii instead.

Whatever your disposition towards Sony or the PS3, it cannot be denied that the console is a very different piece of hardware to the systems that have come before it, including Microsoft and Nintendo's latest offerings. The PS3 is the embodiment of seven years of research into making computers better; facing and overcoming significant technological hurdles others have simply shrugged their shoulders at and a persistence to deliver to the industry a device with its feet planted, for the most part, in the future.

CELL DIVISION

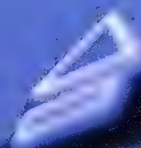
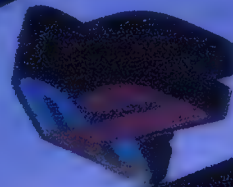
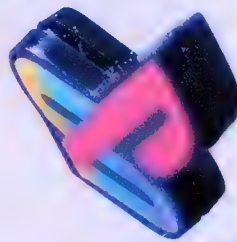
Of all the components in the PS3, it is the Cell microprocessor that has received the lion's share of attention, and rightly so. The joint project by Sony, Toshiba and IBM (STI for short) represents a fundamental change in the way a general-purpose processor should work, a change we're only just starting to see in the consumer desktop space with the release of multi-core CPUs from Intel and AMD.

Cell started life as a series of discussions in 2000 and 2001, with IBM providing the know-how and Toshiba the facilities to produce the hardware. Sony wanted a chip that would outperform the PS2's Emotion Engine by 1000 times. IBM, perhaps the realist in the situation, proposed a 100-fold increase in performance and an architecture that would scale for several years. Other goals decided on in this initial phase included a processor tuned for games and multimedia, responsiveness and platform androgyny. Oh, and it had to be really, really powerful. Like kick-arse powerful.



AY

PLAY



From the start Cell was always going to be a multi-core chip. Manufacturers like Intel had begun to realise that piling on the megahertz was no longer an effective strategy. Hitting this wall in the mid to late game would have meant certain disaster for the project. Cell needed to do much, much more work per clock cycle than other CPUs of the era.

'I think that the period of time where microprocessor manufacturers can just keep increasing clock frequency to get performance improvements has reached the point of diminishing returns,' says Bruce D'Amora, digital media solutions architect at IBM's T.J. Watson Research Center in New York. 'Multi-core processor architectures that efficiently support multithreaded application development are the future.'

The focus on gaming and multimedia meant it was unnecessary for every processing core on the new chip to include general-purpose registers and commands. The design could get away with the a single 'standard' processor to handle normal system demands and administrate, while the rest would be dedicated and highly parallel. This didn't mean the sub-processors would be incapable of handling general purpose jobs, just that they wouldn't be very good at it.

Cell also had to allow for high-bandwidth, low-latency memory transactions between the host and supplementary cores. How fast the cores could figure things out would be irrelevant if the memory input/output system was unable to efficiently feed them.

STI tackled this problem in two ways. The first was to give each supplementary core its own 'local store' that would supply both high-speed caching and data storage facilities. The second was to give each sub core a pair of one-way (read/write), asynchronous direct memory access (DMA) links to the data bus, connecting each with the host core and system RAM through the memory controller. In addition, each supplementary core would have a dedicated channel for communicating with the memory controller.

With an overall design in mind, STI glued together the following hardware to produce the final product:

POWER PROCESSING ELEMENT (PPE)

A 64-bit dual-issue, dual-threaded processor based on IBM's PowerPC architecture would act as the host core. Despite popular belief, it is not dual-core. It does however function similarly to Intel's HyperThreading technology, and when one thread stalls, the second continues to execute.

While not as complete or powerful as the chips you'd find in a G4 or G5 Mac, the PPE would be sufficient. The main difference being in-order execution instead of out-of-order execution, unusual for a CPU but significantly reducing transistor counts, power consumption and heat generation, at the cost of lackluster performance on branching code. The chip, in its PS3 configuration, is clocked at 3.2GHz and features a 32KB two-way set-associative L1 cache and an error-corrected (ECC) 512KB eight-way set-associative L2 cache. For all intents and purposes, it is 100 percent compatible with the PPC instruction set.

SYNERGISTIC PROCESSING ELEMENT (SPE)

Eight 128-bit supplementary cores clocked at 4GHz and built to a new design. Each features eight computational units – four single-precision floating point and four integer – providing 32 gigaflops of theoretical performance. A 256KB 'local store' provides read/write data storage. Any SPE can also be switched to 'Isolation Mode' providing a secure environment in which to run applications (see the *Lockdown!* boxout for more information).

RAMBUS FLEXIO BUS (FLEXIO)

Provides two 12.8GB/s paths between Cell and system memory, for a total bandwidth of 25.6GB/s, when combined

LOCKDOWN!

Each SPE in Cell supports a special setting called 'Isolation Mode' that locks the core out from the rest of the system, save for a few commands and limited read/write capabilities. To initiate lockdown on an SPE, a program must first be loaded onto the target SPE. Once loaded, the SPE and a small chunk of the local store is isolated from the memory bus, and read/write functions to this small chunk can only be conducted by the SPE. The only way to release the SPE from isolation is to send it an exit command, which erases all registers on the chip and clears the local store before complying. Essentially, you could load a key and its decryption program into an SPE, lock it down, and read only the results from the accessible section of the local store. Once completed, all traces of the program and its execution are destroyed.

Of course, this does leave the program itself as an exploitable target, but attempts to read and write data or manipulate the execution of the SPE while it is isolated is impossible.

with Rambus's XDR memory. In combination with the internal bandwidth on-chip, data communication is extremely fast.

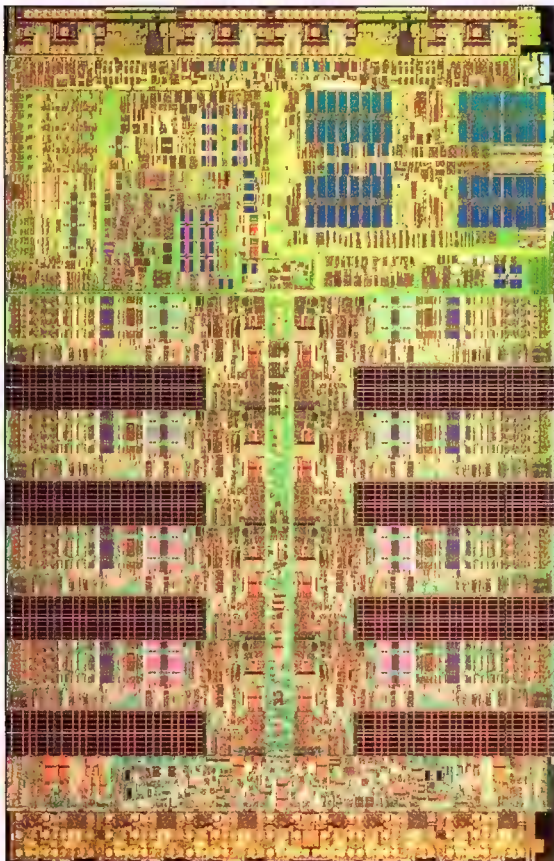
'I think the design goals were all accomplished,' says D'Amora. 'Cell has supercomputer attributes, for example extreme floating point performance and a high degree of on chip parallelism. It can support photorealistic algorithms such as ray tracing. It has a predictable realtime response characteristic, so can support natural interactivity. It is flexible to support a variety of application domains.'

Even six years after the initial design was conceived, Cell is a phenomenally powerful chip and testament to the brilliance of IBM and Toshiba's R&D faculties. Except the Cell chip inside the PS3 is not as good as the one we've just described.

PS3 CRIPPLED?

Not exactly. Sony faced a number of problems transforming the PS3 from a fanboy's wet dream into a purchasable product, most of them engineering-related. Cell was not an easy chip to manufacture given its high degree of complexity.

In a late 2006 interview with EDN.com, IBM's VP of semiconductor and technology services Tom Reeves stated that yields of Cell with all eight SPEs functional was 10 to 20 percent – a dismal number when compared to the 95 percent figure Reeves provides for conventional CPUs in the same interview. Eventually, STI was forced to deactivate one of the SPEs to improve yields. Given that one SPE is also locked out by the hardware for OS/security use, the PS3 is left with seven cores – six SPEs and the PPC – for games and applications. While you do lose 25 percent of the SPEs on the chip, the PS3 is hardly crippled, especially when you consider that there's more to the console than just Cell.



▲ A die-shot of the Cell processor. The chip contains special thermal logic to help balance the workload and extend the life of each SPE.



▲ RSX, the graphics chip inside the PS3, shares a similar design to NVIDIA's 7800 GTX GPU. The RSX, theoretically, has slightly higher performance.



'This means that 92.7 percent of available PS and PS2 games will not work on our version of the unit... it is a cost-cutting measure, plain and simple.'

NO, NOT THE CAR

NVIDIA's RSX chip supplies the PS3 with 3D acceleration and audio. On the sound side, the PS3 uses a version of NVIDIA's excellent Soundstorm technology, the same one that vanished from the company's desktop chipsets a few years ago. While Sony has not confirmed this as fact, given that the device's audio outputs lead out from the RSX chip, it's a safe bet.

As for graphics, RSX is based on the G70 architecture, or NV47 as it was also known. The original specification for the 3D subsystem called for a 550MHz core with 256MB of GDDR3 at 700MHz (1.4GHz effective), 28 pixel pipes and eight vertex pipes. In order to improve yields, Sony deactivated four of the pixel pipes and reduced the clocks to 500MHz and 650MHz respectively, essentially transforming RSX into a faster clocked 7800 GTX. The fixed allocation of shader pipelines means that, unlike the AMD R600-based chip in the Xbox 360, RSX cannot dynamically allocate its pipes and is not a unified architecture. We don't know how this will affect performance in the future, but it does damage the impression of the PS3 being a futureproofed console, at least in the arena of 3D acceleration.

A 3D chip is not enough to make games – developers require an application programming interface, or API, to communicate with the hardware. Sony, not wanting to create its own API and teach developers how to use it – a significant departure for a company dedicated to creating proprietary specifications – chose to go with the widely available and popular OpenGL.

OpenGL, originally developed by Silicon Graphics for its workstations, is one of the two big 3D APIs in the industry, the other being Microsoft's Direct3D. Microsoft, being a direct competitor with its Xbox 360, removed Direct3D as a choice, leaving OpenGL as Sony's only avenue.

Armed with OGL, Sony had both the hardware and the software to transform the PS3 into a video game console.

PROBLEMS OF THE DEEPLY BEDDED

Yes, Sony went with OpenGL, but not the desktop version – used in Doom 3 and the original Half-Life – that we in the PC

world are familiar with. According to a 2006 presentation by Sony Computer Entertainment's Mike Weiblen for the Khronos Group, which oversees the OpenGL standard, the PS3 uses its own version of OpenGL ES – the embedded system version of the API – called 'PSGL'. By embedded systems, we mean PDAs, mobile phones and similar devices.

If at this point you're wondering why Sony would chose a 3D API designed for devices with negligible graphics demands for a high-performance video game console, don't worry, we were surprised as well.

Sony's main reason for using OpenGL ES as a foundation was that vanilla OpenGL was bloated with legacy APIs that would never see the light of a phosphor tube on the PS3. Problem was OpenGL ES 1.0, the particular revision PSGL is based on, did not have a programmable pipeline and hence relied on fixed functions in the 3D API. Without changes, OpenGL ES represented the Stone Age of 3D acceleration.

But Sony did make changes. In fact, it wrote its own programmable pipeline into the specification – a huge undertaking, but a necessary one. It seems the prospect of adding a free-form pipeline was more appealing than carving swathes of code from the chunky desktop OpenGL. To code the shaders, Sony naturally went with Cg, NVIDIA's high level shader language (HLSL).

During the development of PSGL, the Khronos Group released OpenGL ES 2.0, introducing a programmable pipeline into the specification. Unfortunately, it came too late to be used for PSGL.

CODE ACHES

We mentioned earlier that the PPC in Cell is an in-order execution processor. This means that the processing pipeline is required to wait for all the information for a command before it can execute it, while an out-of-order processor can execute other commands in the interim. Essentially, as long as code branching is kept to a minimum and the processor does not have to constantly wait for results, then it should not stall.

Mike Acton, a developer for High Moon Studios believes it is

'critical' that code be as branchless as possible, according to his presentation at the 2006 Austin Game Conference. Acton also stressed in the presentation that data access patterns have to be as efficient as possible to maximise the low-latency, high-bandwidth design of Cell.

While a good compiler – which turns human-readable code into machine language – can do a lot of the work in optimising a program, only the developer knows their code intimately enough to make the most worthwhile refinements, truly placing the success of the PS3 in their hands.

Even with good code, tapping into Cell's massive parallelism and utilising each SPE to its fullest is the key to getting the best out of the chip, but even with the proliferation of dual and quad-core CPUs in the desktop PC space, multi-threading remains a daunting proposition for developers.

'I think there are some programmers who are very enthusiastic about moving to multi-core while others are more tentative,' explains D'Amora. 'Generally speaking, most programmers have had little experience with high degrees of parallelism in their applications because historically workstation and server microprocessors have been single core or at best dual processor systems. That being the case much of the code – and algorithms – were based on a single threaded model. Multithreaded versions may require a re-think of the algorithms let alone a port of the code. This takes some time, but the performance benefits are substantial.'

SEEING THE LIGHT WITH LINUX

For the hobbyist, all this talk of coding for Cell isn't just an exercise in the theoretical. Sony has seen fit to allow the average user to install another operating system on the PS3's hard drive without taking the unit to your local mod shop, as long as it's compatible with the PowerPC architecture. When you consider that a large number of Linux distributions that support the platform exist, taking advantage of Cell for your own ends is very possible.

Still, getting Linux onto the PS3 takes a bit of work and comprehensive instructions can be found on IBM's website here: www-128.ibm.com/developerworks/power/library/pa-linuxps3-1. Note that the guide uses a distro called Yellow Dog Linux, a joint effort by Sony and Terra Soft Solutions. With a bit of fiddling though, any PPC-compatible version of Linux should run happily on the PS3.

Be aware that running Linux has a few drawbacks. In order to prevent home-brew games development, the hypervisor – a virtual machine interface that both Linux and the PS3 OS are run on – does not allow access to the 3D accelerator, limiting graphics tasks to the frame buffer. The SPE isolated for security remains in this state and you won't be able to use the deactivated SPE either.

Otherwise, complete access to Cell and its powerful resources is there. The PS3 has no issues running PPC programs, and if you code and compile for the SPEs, expect performance far and above that possible from conventional CPUs.

BACKWARDS INCOMPATIBLE

When the PlayStation 2 was released in 1999, it was almost completely backwards-compatible with the original PlayStation, using a combination of hardware and software emulation. The slimline model of the PS2 further reduced incompatibilities, and it is extremely difficult to find a PlayStation game that won't run on that revision of the console.

With the launch of the US and Japan versions of PS3 in November 2006, Sony continued support for the PS2 and PlayStation by embedding the condensed Emotion Engine/ Graphics Synthesizer chip found in the slimline PS2 onto the

PS3 motherboard.

So just how backwards-compatible is the PS3? Late last year *Sankei*, a Japanese newspaper, quoted a spokesperson from Sony stating that 200 older games had problems running on the PS3. According to Sony's corporate site, 7907 games exist for the PS and 8571 for the PS2 as of December 2006, making for a total of 16,478 games. If these numbers are correct then the US/Japan PS3 is 98.8 percent backwards-compatible. Not that this matters to us.

The European/Australian version of the console will only support a mere 1200 of these games according to Phil Harrison, president of Sony Computer Entertainment, Worldwide Studios. This means that only a paltry 7.3 percent of PS and PS2 games will work on our version of the console immediately after launch.

The reason for this sad number is the removal of the EE/GS chip from the PAL PS3, replaced by just the Graphics Synthesizer and a software emulator. Regardless of what statements Sony may make to justify the removal of the chip, it is a cost-cutting measure, plain and simple, and goes against an ethos Sony has pushed since the PS2's debut almost seven years ago.

Whether later versions of the NTSC console will befall a similar fate is speculation at this point.

NEXT STEP

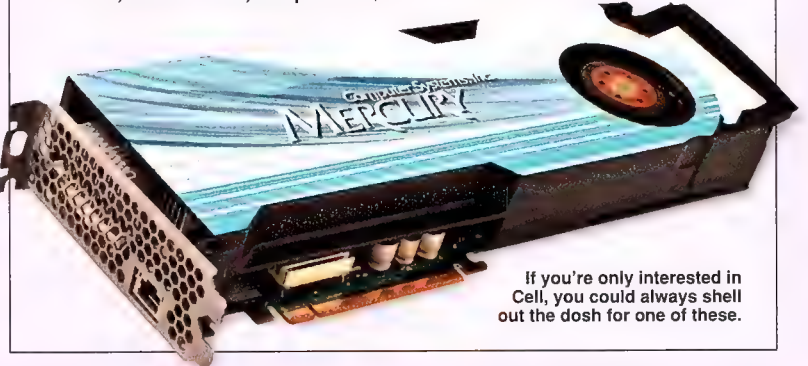
New iterations of the PS3 console will undoubtedly bring fresh opportunities, if you feel you have the fortitude to wait another year or so. Sony recently announced that it will begin volume production of a 65nm Cell, down from 90nm, which should help reduce the cost of the console. Firmware updates will be available regularly for PAL PS3 owners to improve backwards-compatibility. As hobbyist developers come to terms with the capabilities of the PS3, new uses for the console should reveal themselves, from amazingly efficient distributed computing systems to video and audio encoding juggernauts, not to mention games coming of age.

'It always takes some time after the release of a new console for programmers to really take advantage of the performance and functionality,' says D'Amora. 'I think we'll see some very impressive games and gameplay over the next year.'



CELL ON A CARD

Cell was created for more than just the PS3. It's being used by IBM in its server products and sold to third parties like Mercury Computer Systems here. It looks like a graphics card, but underneath that meaty heatsink and fan rests a Cell chip. The model shown below is clocked at 2.8GHz, 400MHz slower than the one in the PS3, but comes with 1GB of XDR RAM and 4GB of DDR2, dwarfing the PS3's tiny 256MB. It fits into a standard PCI Express x16 slot and sucks 210W of juice, requiring 150W via two power connectors in addition to the 75W supplied by PCI-E. It even has Gigabit Ethernet, all at the low, low price of \$9900.



If you're only interested in Cell, you could always shell out the dosh for one of these.

INSIDE THE

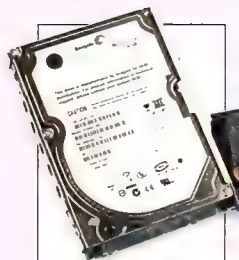


1

1 OFF COMES THE COVER

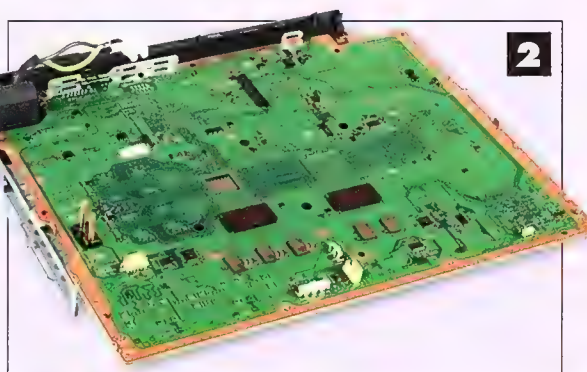
The PS3 isn't that hard to take apart, as long as you do a bit of planning. It's also something we don't recommend unless you fancy the chance of destroying \$1000 worth of gear.

If you do decide to proceed, you'll need two things – a Torx screw set and a Phillips head screw set. To start, peel away the small square sticker that sits a few centimetres above the HDD cover. Place this somewhere safe and pull out the bit of rubber underneath it. Don't worry, you'll need a little force to get it out. Under it is a Torx screw. Undo it and pop off the plastic PS3 shield. Finally, undo all the Phillips head screws you can find and carefully remove the main cover. It's hinged from the front of the unit, so keep this in mind.



HARD DRIVIN'

Unlike the US and Japan, Australia has only the one choice of console, and that's the 60GB model. The drive inside the model is a 5400rpm Seagate Momentus, and is indeed 60GB in size. Curious as to the contents, we hooked the drive up using a 2.5-inch caddy. Surprise, surprise, it was totally blank.



2

2 UNDER THE MOTHERBOARD

This is probably the most complex step, as it involves unplugging a few ribbon cables. The Blu-ray drive should lift straight out, just disconnect the power cable and ribbon. Next is the PSU, which is attached via a series of Phillips head screws, a front power cable, a rear power cable and a grounding wire. Undo all of these and lift the PSU out. The PCB with the eject and power buttons also needs to come out, so unscrew it and carefully detach the data cable. Note that all the data cables have a latch – be sure to unlock these or you'll risk damaging the fragile ribbons. Finally, take out the big screws on the suspension plates in the centre of the board.

Now, you can also detach the controller card for the game

pads, but it's not necessary if all you want to do is remove the under-plate. You can simply undo all the screws around the plate and it'll come right off, exposing the underside of the mobo.



3

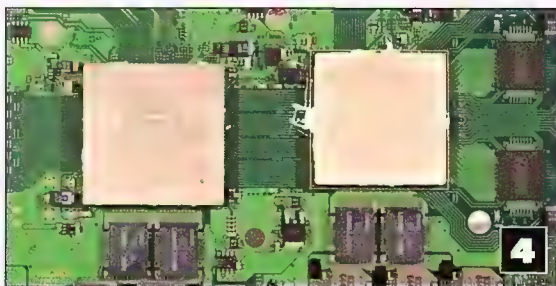
3 HEATSINK AND FAN FUN

Before we can rip the guts of the console out, we need to take out the HDD. Using either a fingernail or a flathead screwdriver, pop off the cover to the HDD. Undo the blue screw, flip up the steel wire handle, shift the drive towards the front of the unit and slip it out.

Now lift the entire motherboard assembly out of the PS3 and place the chassis to one side. Turn the assembly upside-down and check out the single(!) 160mm fan that cools the PS3. Pretty impressive.

Unplug the battery (far left-bottom corner in the above photo) and the fan (far right-bottom). Undo the three screws around the fan and remove it. Next, remove the power socket – it should be on the verge of falling out anyway – and carefully remove the plastic backplate – it is held on with a few plastic tabs, which should come free without a great deal of hassle. Undo the two tiny screws that secure the drive bay to the rest of the assembly.

To the left in the photo above, you'll see a soft foam strap. It's secured to the motherboard plate at the end near the battery, so carefully pull it off. Okay, now you need to, with gentle force, remove the heatsink assembly. We recommend attacking each corner in turn until the lot comes loose.



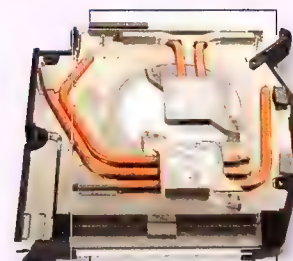
4

4 THE MOTHERLOAD

Undo any final screws around the plate that the removal of the heatsink reveals and take it off. What you'll find

PS3

What was the first thing *Atomic* did when it received its PS3? Played a few games on it of course! The second thing we did was pull it apart. Logan Booker conducts the autopsy.



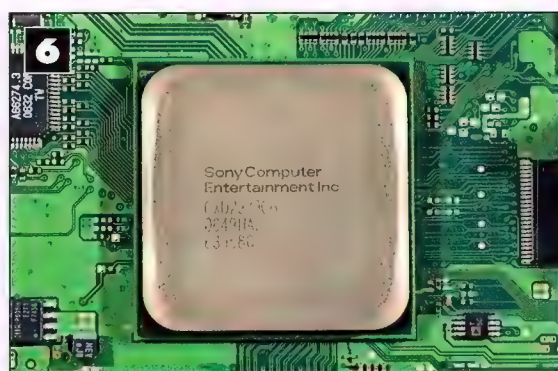
INSIDE THE PS3

underneath is the motherboard for the PS3, which contains from left to right: the PS2's Graphics Synthesizer; NVIDIA's RSX; the Cell BE processor and, above it, a southbridge chip. On the US/Japan PS3 board, the space taken by the PS2 GS contains the compacted Emotion Engine/GS of the slimline PS2.



5 IS THAT G70?

That answer to that question is 'Yes'. The NVIDIA-made RSX in the PS3 is a slightly more powerful version of NVIDIA's G70/7800 GTX chip. RSX is a generation behind the 8x00 series, as well as the R600 prototype in the Xbox 360, and could end up being the weakest link in the PS3's hardware.



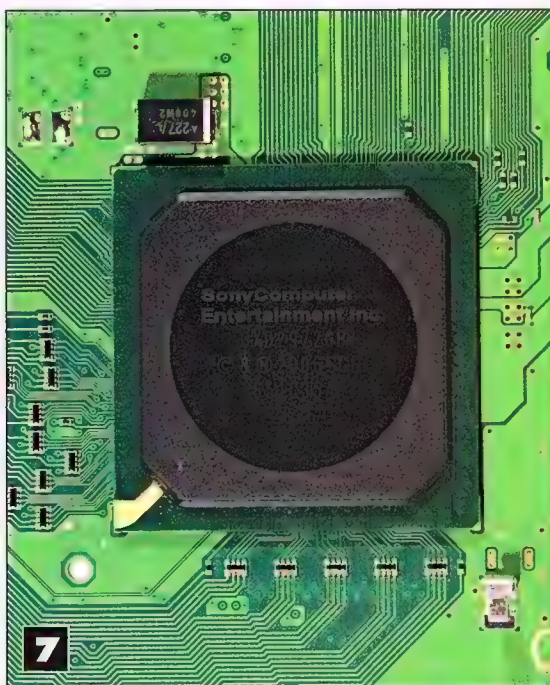
6 WHAT GOES IN...

From what we can gather – no documentation was available to aid in our assessment – the above chip controls the majority of the I/O functions for the PS3. It should be noted that this chip is smaller than the one on the US/Japan board, and may signify a reduced manufacturing process – most likely 65nm. Attached to the chip are two 128MB Samsung NAND flash chips, and may store the operating system and firmware.

7 BYE, BYE PS2?

Almost, but not quite. For the Australian version of the console, Sony has removed the EE/GS combo we first saw in the slimline PS2, along with the two 32MB RDRAM modules

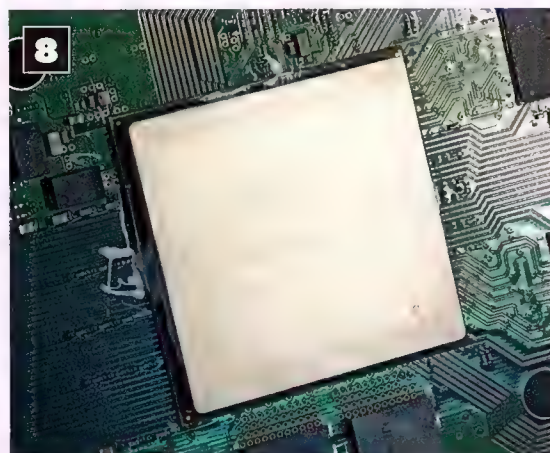
for the processor. What's left is the GS alone, leaving Cell to handle software emulation. Oddly, instead of detecting whether or not a PS2 game will work, the PS3 will have a go at loading the game, and throw up an error message if it lacks support. For *Cars*, the single game we did get working, other than upscaling it looked and played fine.



8 CELLDOM SEEN

Finally, we come to STI's Cell Broadband Engine, the heart of the PS3. Attached to Cell are four 64MB Elpida XDR RAM chips with a latency of 2 to 2.5ns.

A few other chips make an appearance on the PS3 motherboard, including a HDMI controller from Silicon Image, and a Marvell chip to handle Ethernet and networking.



PIPING HOT

The cooling hardware for the Cell BE chip and NVIDIA's RSX is this monster above. Heatpipes draw heat away from the processors and evenly distribute it around the HSF. While the unit still gets hot in places (see below), the PS3 has yet to crash while we've been playing it. Score one for Sony.



COOL JOB

Yes, the PS3 is kept at normal operating temperatures by a single 160mm fan and a heatpiped heatsink (see above). While the console works fine, holding one's hand on the back of the unit, or its underside near the HDD, it is very hot to the touch. If you happen to live somewhere warm, like, uh, Australia, make sure the PS3 is, at the very least, well ventilated.



A History of OVERCLOCKING

PART ONE

For as long as enthusiasts have had fingers to flick DIP switches, so too has existed their desire to overclock all manner of processors. Craig Simms examines this ancient art over the ages.

While we spend a lot of time looking forwards, sometimes it's good to know where we came from. Sure we all take FSBs, multipliers, HyperTransport and RAM ratios for granted these days, but there was a time when only the FSB existed. Wouldn't it be nice to have a better comprehension of what it is we actually tweak, instead of blindly punching in numbers?

With this ensconced firmly in our skulls, we burrowed into the foggy muck of PC history to analyse how overclocking developed, and we have thrown in a great deal of back story in order to increase your understanding of past eras.

Basics: How a clock works

A clock on a motherboard is generated by a clock crystal, or crystal oscillator. Typically these run at 14.318MHz, a rating that has not changed since the dawn of PCs. The oscillator uses the resonance of a piezoelectric crystal, usually quartz, which through the application of a voltage will return a reliable pulse – in this case the aforementioned 14.318MHz. This is known as the system clock.

This creates a problem, though: nothing runs at 14.318MHz. To overcome this, a circuit needs to be introduced to derive the speeds required. An exception to this is in the case of dedicated chips – you'll often find a 25MHz oscillator next to a Marvell Gigabit LAN chip or a JMicron SATA controller, and a 24.5MHz one next to a Texas Instruments 1394 controller.

A Phase-Locked Loop (PLL) is the required circuit that generates the speeds we need for modern bus operation on the motherboard. These days up to four can be found inside a clock generator – a chip usually located near a 14.318MHz oscillator that it will be in series or parallel with – driving CPU,

PCI-E, SATA, PCI, memory, FSB and most other things that need a clock.

The PLL allows us to change bus speeds through a few choice components – namely a phase comparator, Voltage Controlled Oscillator (VCO) and a down counter (divider). A basic circuit is shown in Figure 1.

The reference clock leaves the oscillator and enters the phase comparator. The phase comparator has two inputs, one from the reference clock and another looped back in from the VCO.

The comparator compares both frequencies and then generates a voltage based on the difference of the two inputs. If they're the same value, it continues outputting the same voltage and the VCO keeps oscillating at a fixed rate, giving us our output frequency. In the example above, the circuit would simply produce a final frequency of 14.318MHz – exactly the same as the crystal oscillator.

In order to get a slower speed, the original processors inserted a divider between the reference frequency and the phase

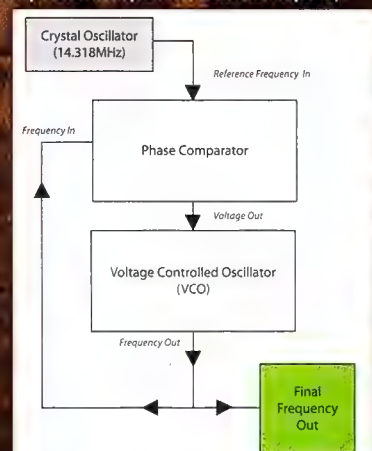


Fig 1. A basic PLL circuit.

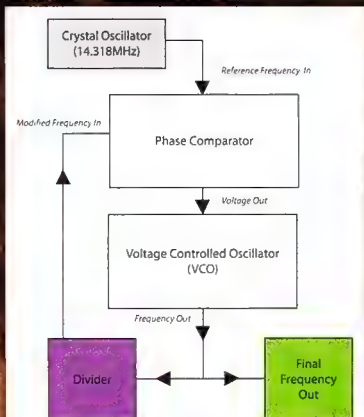
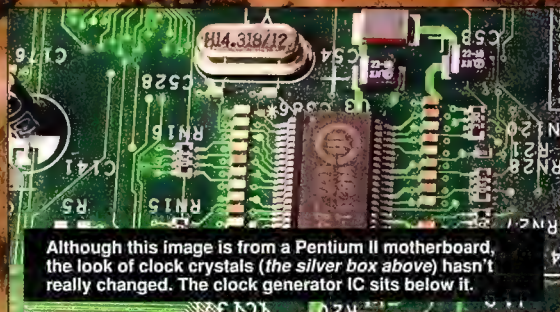


Fig 2. Inserting a divider after the VCO will increase the output voltage of the phase comparator.



Although this image is from a Pentium II motherboard, the look of clock crystals (the silver box above) hasn't really changed. The clock generator IC sits below it.

OVERCLOCKING



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The 286 was a huge step up for Intel.



The mighty 386 brought computing and 32-bit to the unwashed masses.



Similar in look to the 386, the 486 contained considerably more punch. Both processors will be produced for embedded systems until September 2007.

produced 286s capable of 16, 20 and 25MHz, far outstripping Intel's offerings – even though this was seven years later than Intel, and by this stage the 486 was already on sale. AMD was still an Intel licensee at this stage, but this situation wouldn't last long.

The 286 featured two operating modes – Real Mode, that essentially made it a very fast 8086 that could access 1MB of memory, or Protected Mode that while offering a number of advantages, its biggest one – other than the ability to terminate misbehaving programs without bringing down the whole system – was being able to offer up to 16MB of memory to applications. The biggest problem was that you had to reset the PC to switch between modes, ignoring the fact that most PCs didn't have more than 1MB of RAM in those days anyway. As a consequence, Protected Mode was mostly ignored until the 386.

At this stage memory was Fast Page mode RAM (FPRAM), in 30-pin Single Inline Pin Package (SIPP) format. Rather than specifying a row and a column every time to isolate a location and read or write a bit, FPRAM kept a row highlighted and strobed the columns if there were successive entries in the row that needed attention, saving on RAS precharge time.

386 (1986-1989, 1.5µm - 1µm process, 16-40MHz)

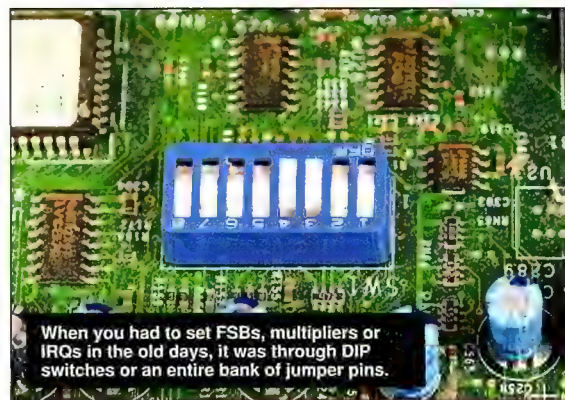
The next evolutionary step was introduced with the 386. It could be argued that this 32-bit chip popularised PCs, but it wouldn't be until 1995 that we'd get an operating system that could take advantage of its registers. By the time Windows 95 came out, the OS was capable of crippling a fast 486, let alone a 386. The clone PC market started with gusto, with Compaq beating IBM to market.

The hundreds of components featured on the 8088 and 80286 motherboards had been condensed into one chip, called the 'chipset' by a company named Chips and Components. The idea caught on rapidly and there were many competitors, but by 1994 there would only be one powerhouse chipset manufacturer – Intel.

There were two types of desktop 386 – the SX, which had a 16-bit external bus and was soldered to the motherboard, and the DX, which got the full 32-bit both inside and out and was socketed.

Overclocking the 386 had shifted from the days of clock crystal swapping. While these days we tend to use jumpers purely to reset the CMOS, banks of the things or a series of DIP (Dual Inline Package) switches were on motherboards that would do things such as manually set IRQs, voltages, allow the BIOS to be written to and to set the speed of the FSB. Before the 286 days these would even determine what hardware was present in the machine, but by this time that functionality had been shifted to the BIOS, and hardware was automatically detected instead.

The 386 brought 32-bit Protected Mode into play – allowing the system to address 4GB of memory – and could



When you had to set FSBs, multipliers or IRQs in the old days, it was through DIP switches or an entire bank of jumper pins.

auto-switch between Real and Protected with no problems. A third mode, Virtual Mode – otherwise known as VM86 – was introduced, making it feasible to run a number of virtual machines simultaneously within a Protected environment. This led to multitasked DOS programs through managers such as QuarterDeck's DesQView.

Cache was provided for the first time asynchronously on the motherboard, as DRAM could no longer keep up with speeds beyond 16MHz, 64KB of cache of the huge, socketed SRAM being the highest you could get.

Intel refused to reveal the specs of the 386 to AMD, which ended in Intel attempting to nix the agreement for AMD's access to all x86 code. Several court cases later, it was determined that AMD had the right to copy Intel's x86 architecture through the companies' 1982 agreement. As such the AM386 was the first AMD in-house designed chip, although large portions were reverse engineered from Intel's solution.

To this day, Intel is still making its 80386 as an embedded processor, with production slated to stop in 2007 – a good 21 years after its introduction.

486 (1989-1993, 0.8µm Process, 25-100MHz)

The 486 arrived and while the SX variants like the 386 were floating point crippled and soldered, the DX units came with the FPU integrated, removing any off-die bottlenecks.

Heatsinks on later 486 chips introduced a low-profile fan mounted to a thin piece of copper sitting on top of the CPU, bonded by thermal glue or held down by plastic clamps – the fan, sink and CPU all the same dimensions. For the most part though a passive heatsink was used.

VESA Local Bus, or VLBus was introduced at this stage to overcome video card bandwidth issues related to the ISA slot. This existed as an ISA port with a separate extended port below it, and although it was asynchronous it was often set to run at the same speed as the FSB, from 25 to 50MHz.

Memory by now was up to 60ns, and the 486 introduced burst mode – after a read the machine could then access the next three adjacent states with no latency penalty or wait states. The amount of cycles need to access the four states were referred to in the form of x-y-y-y, where 'x' equalled the first access time (latency + cycle time) and 'y' represented the cycles required for each following access. Today these are known as CAS Latency (CL), RAS to CAS Delay (tRCD), RAS Precharge (tRP) and Active to Precharge delay (tRAS).

At this time, standard RAM was rated at about 5-3-3-3. This came in a 30-pin Single Inline Memory Module (SIMM) form factor, and began creeping in with late 386 boards. SIMMs ran on an asynchronous 16MHz bus, making it a bottleneck compared to the processor.

'To this day, Intel is still making its 80386 as an embedded processor, with production to stop in 2007 – a good 21 years after its introduction.'

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With 30-pin SIMMs came interleaving, a technique which alternated even and odd bytes between two SIMM sticks. While one was being read the other would precharge, reducing latency and precharge times. Of course this meant you needed double the RAM to get the effect and to further complicate matters each stick of SIMM had an 8-bit data path. So, while two sticks were needed for those processors with a 16-bit data path (386), four slots needed to be occupied at a time to work those with a 32-bit path (486).

Then 8KB of L1 cache was moved on-chip and L2 cache was introduced, still on the motherboard like the original 386 cache SRAM – this time upsized to 256KB. Many dodgy motherboards turned up with L2 cache missing, or fake cache that was nothing more than a bit of plastic with metal legs to cut manufacturing costs.

Although not strictly related to overclocking, we have to mention id Software's DOOM, which changed the performance computing world forever. Sound cards became important. Although introduced with the 286, Protected Memory Mode became a must have for gaming, allowing access above the base 640KB of memory. At this point the systems could support up to 4GB of memory thanks to the 32-bit nature of the 386, but even by the time of the 486 most people had one thousand times less than this.

Apart from the sound card and everyone jumping on the 1MB or higher video card bandwagon for high-colour graphics, DOOM single-handedly drove the standard adoption of 8MB RAM – let alone the upgrade phenomenon in general. After this point, PC performance was all about the games.

The 486DX2 introduced one of the most important elements to the overclocker – the concept of the multiplier. Up until then, the processor simply ran at the speed that the FSB did. With the introduction of a 2x multiplier, the processor could provide two clocks for every one that the FSB put out, doubling the frequency and giving better performance.

It was here that Intel started the practice of crippling high-end processors to perform as lower ones or re-rate those that didn't pass internal tests. The first 486SXs were shipped with the FPU included but disabled, and later it was removed altogether. This procedure of marking down failed higher level CPUs and selling them as low-end really allowed the overclocker to go nuts – while some chips may have failed testing early on in the process and weren't capable of much more than what they were rated, others may have failed just before the higher clock speed, allowing the remarked CPU to go almost as high as the more expensive CPU. This introduced the concept of 'ceilings', or how high a frequency a processor could reach within a given process.

Later 486 boards with co-processor sockets would allow a 486DX2 to be installed, and the SX disabled via a jumper on the board.

It was common to be able to run the 486SX25 at 33MHz by simply moving a jumper to set a higher bus speed, enough so that even dodgy retailers caught on. This turned into the first known overclocking scam – many stores clocking the slower chips up and selling them in systems for the price of the higher rated chips.

From 1992 through to 1996 the PCI slot was slowly phased in, replacing both ISA and VLBus and running at 33MHz, with a peak transfer rate of 133MB/s. This was not fixed at this stage, as it ran as a division of the FSB which was PLL determined. It had two separate revisions that would come to be used mainly in servers – PCI 2.x which ran at 66MHz (266MB/s) and PCI-X which expanded the bus

from 32 to 64-bit, and ran at 133MHz for 1064MB/s of peak bandwidth. Yet, like the floppy drive, it took an obscenely long time to kill ISA altogether.

Intel released the DX4-100 as an 'overdrive' chip, although AMD pipped this with a 120MHz design. The age of the multiplier was upon us.

5x86 (1995-1996, 0.35µm process, 133-150MHz)

AMD's 5x86 was internally exactly like a 486, just with the multiplier set to four. A lot of people opted for these over the Pentiums, due to early performance troubles and the infamous FPU bug.

Intel would not take long however in perfecting the Pentium architecture and establishing the biggest performance leap to date.

Pentium (1993-1997, 0.8µm-0.25µm process, 60-300MHz)

The Pentium came in 1993, initially offering astounding speeds of up to 90MHz. The 486DX4/100 also came, although by this time the Pentium was offering 120MHz and had a significantly more effective marketing campaign behind it. The personal computer was now available for the mainstream.

The Zero Insertion Force (ZIF) socket was born in about the mid-'90s, replacing Low Insertion Force (LIF) sockets that had no handle, and made user upgrading a possibility without specialist tools. While this allowed mass upgrading for 486 and Pentium users, it could be argued that it wasn't until the arrival of Pentium II and Slot 1 that the idea massively caught on.

The Pentium's heatsinks were slightly more elaborate and taller than the 486's, but still featured a relatively tiny fan.

Extended Data Out (EDO) RAM was introduced in the form of 72-pin SIMMs, running at 66MHz, as it became painfully obvious that the previous generation of RAM wasn't keeping up and the cache wasn't saving it. The 72-pin SIMM EDOs were 32-bit each, requiring only one chip for the 486, but two to feed the Pentium's 64-bit data path. EDO RAM's advantage was that when starting a new cycle it could keep the data path open from the previous access, allowing precharge of a new column while the old column was transferring data. This got timings down to 5-2-2-2.

In 1996 id Software's Quake came out, requiring a floating point processor and locking out everyone who owned a 486SX or older.

Pentiums were reasonable overclockers, and the process was pretty simple – move the jumper from one speed setting to the next on your motherboard. A few P75s would happily run at P90 speeds.

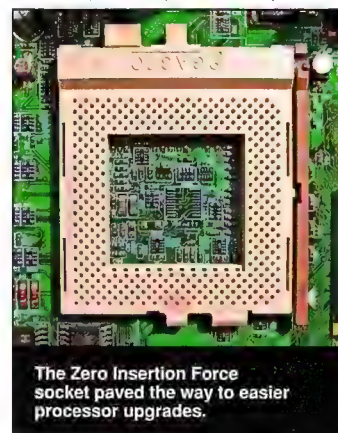
The Pentium MMX made a brief appearance around this time, and made use of the first Single Instruction, Multiple Data (SIMD) instruction set. Multimedia applications that supported it saw increased performance.



The chip that started the MHz revolution, the Pentium.



72-pin RAM brought things up to speed for the Pentium.



The Zero Insertion Force socket paved the way to easier processor upgrades.

For a while the 'Pentium Overdrive' chip existed, which despite the name was a complete CPU replacement, available for 486 (increasing the clock speed) and early Pentium (increasing the multiplier) architectures. The 486 edition required voltage regulators as Pentiums ran at 3.3V and 486s 5V, both a far cry from the 1.2V to 1.3V of today's systems. Compatibility was a problem with the Pentium Overdrive, and it typically didn't provide the same performance as true Pentiums of the same frequency due to the legacy components not being able to keep up. The value minded customers went for AMD and Cyrix's 5x86 processors instead. The original Pentium made it to an amazing 300MHz – with an FSB of 50/66MHz depending on the processor – living until the introduction of the 233MHz Pentium II in 1997.

K5/5k86

(1996-1997, 0.35µm process, 50-133MHz)

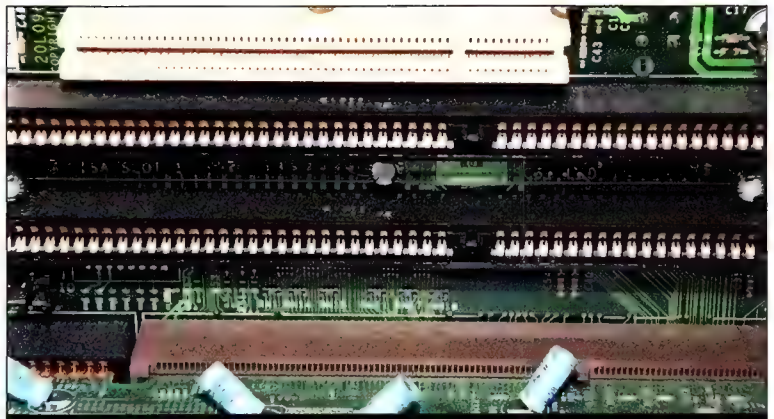
The K5 was truly AMD's first in-house chip, and as a consequence was two years late. It had good x86 compatibility but lacked the MMX instructions that Intel introduced with the Pentium and performed FPU calculations about twice as slowly.

The K5 marked AMD's first use of a Performance Rating (PR), attempting to match up chips of slower clock speed with Intel's faster equivalents – for example, the 133MHz part was called the PR200. It's fair to say that in the eyes of most consumers the K5 was a non-event, though it did lay the first brick on AMD's path to performance supremacy. The K5s ran notoriously hot, and we were able to uncover one forum entry that suggested a peltier should be used if overclocking one! Despite the different path AMD took, the K5 still used Intel's sockets, in this case Socket 5 and 7.

Pentium Pro

(1996-1998, 0.25µm process, 150-200MHz)

The Pentium Pro was actually the first of Intel's sixth generation x86 architecture. While it was originally planned to replace the Pentium, it was shortly relegated to the server/high-end desktop field due to the high cost. This would pave the way for Intel to separate its desktop and server offerings into the Xeon range, which typically featured more cache, unlocked multipliers, allowed more than 4GB of RAM and had the ability to run in quad or eight CPU configurations.



It took about eight years for ISA slots – below the PCI – to die. By this standard, we should get rid of PCI as soon as there's an interface to replace PCI-E. Check out the awesomely sturdy capacitors on the bottom of the board.

The reason for the Pro's expense was that the L2 cache was moved into the processor package, and ran at core speed, however the L2 die sat apart from the core. This led to the creation of the most hilarious tech name ever – the back side bus – which connected the CPU to the external cache. Intel, clearly aware of the name, called it the 'dual independent bus'. Despite the speed advantage and being able to access main memory and cache simultaneously, the manufacturing process wasn't perfected, requiring the two separate dies to be bonded together before they could be tested. A flaw in either die meant the whole chip needed to be discarded, meaning a low production yield and high cost. It did however mean decent overclocks, the 200MHz variant in some cases hitting 300MHz.

The Pentium Pro would be later modified to become the Pentium II, and an overdrive processor would be made for the Pentium Pro, giving access to 300 and 333MHz speeds and significantly better processing of 16-bit code, for which the Pentium Pro was awful.

Tune in next month...

That's all for this issue – we hope that's given you some idea of why things are the way they are today, and a greater understanding of exactly what's going on when you overclock. Next issue, the picture comes clearer as we wind forward all the way to the Core 2 Duo. (E)



The 5x86 was AMD's first chip to use a PR rating instead of just listing the MHz.

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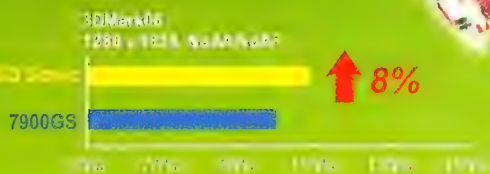
The Award Winning Graphics Card



Palit Sonic Series Outstanding OverClocking Edition



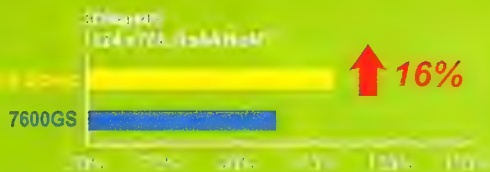
7900GS Sonic



7900GS Sonic
256MB/256bit DDR3
M/C:1400/500MHz

7900GS
256MB/256bit DDR3
M/C:1320/450MHz

7600GS Sonic



7600GS Sonic
256MB/128bit DDR3
M/C:1000/450MHz

7600GS
256MB/128bit DDR2
M/C:800/400MHz

7300GT Sonic



7300GT Sonic
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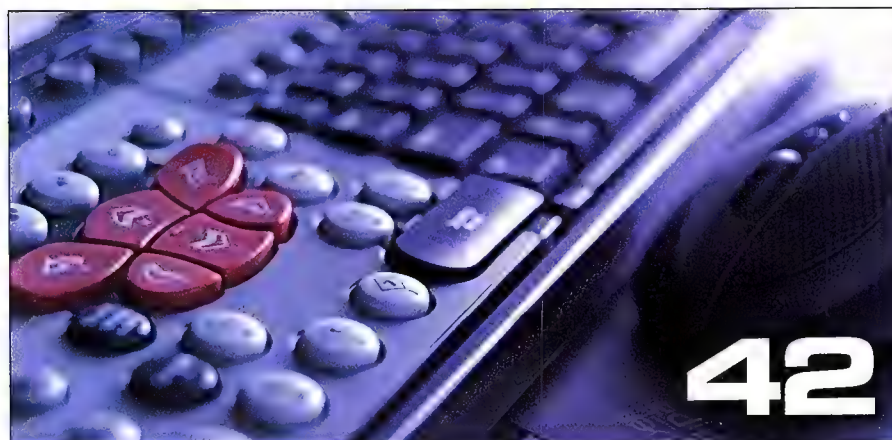
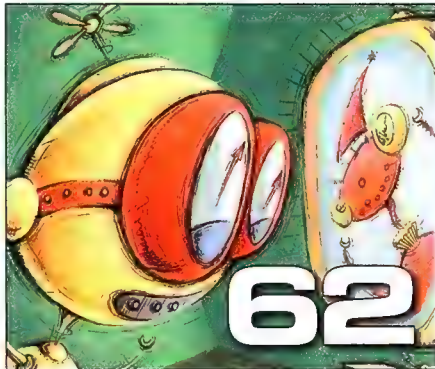
NEWS, REVIEWS AND ROUNDUPS ON THE LATEST HARDWARE

The months fly when you're waiting for R600. Yep, pushed back another month, and we're not entirely sure it's going to come on time this time either. It's like waiting for death, but not actually doing anything to expedite the process. Is it now? Nope. How about now?

In the meantime NVIDIA is quite happily holding back the release of the

rest of the 8x00 family, and is in no danger of having to drop prices thanks to lack of competition. Ah well.

This month we've thrown a few gaming peripherals together to find the ultimate solution, thumped through the hardware reviews and Dan goes nutty over user interfaces. All the perfect ingredients for the hardcore recipe.



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BENCHMARK

How we test,
what we test,
when we test it

3DMark05 and 06 are the legs of our bench. As freely downloadable tools, they allow people all around the world to compete on a single platform, regardless of its indication of real world application, and its ability to keep our table stable.

On the gaming surface, Call of Duty 2 takes first honours in the FPS department. Quake 4 follows closely behind for our OpenGL benchmarks, taking over from where the venerable Doom 3 left off and offering multiple CPU optimisations. Half-Life 2 remains, its market penetration simply too huge to ignore. X3: Reunion makes an appearance, in an effort to have a benchmark that is not an FPS. In the same line, Splinter Cell: Chaos Theory has also been added. Other games do exist. Honest.

All tests are run at 1280x1024, 1600x1200 and 1920x1200 with vsync off, to cater for the most popular LCD resolution, CRT resolution and those who own widescreen monsters respectively.

To hit the CPU, we use LAME MT, a multithreaded version of the popular MP3 encoder, which is used to compress a standard 30-minute WAV file. Similarly, VirtualDubMod is used to compress a standard 1GB raw video file into XviD at 1300Kb/s. Other CPU specific tests in our stable are Maxon's CineBench and SuperPi Mod. Rounding out the suite, SiSoftware's Sandra tests several subsystems across the board, while HDTach and ATTO Disk Benchmark helpfully provide hard drive scores.

All these tests are run on a Windows XP SP2 platform, running the latest official drivers available. Every test is run three times to eliminate any oddities that may crop up along the way, the final result printed in the magazine being an average of those scores.

Of course, all this is pointless without a standard set of hardware, and as such it is laid out below for the world to see. On with the testing!



The Atomic Hot Award is given only to the best. In our roundups, we differentiate the best further using the following awards:

VALUE AWARD This means the product is the best buy price-wise.

PERFORMANCE AWARD Price isn't a big factor – it just has to make our benchmarks burn and our eyes water.

EXTREME AWARD Forget everything. If it's mind-blowingly amazing, then it'll get an Extreme Award.

BENCHMARKS

Graphics

3DMark05

Game tests only, 4xAA, 8xAF
www.futuremark.com

3DMark06

Game tests only, 4xAA, 8xAF (SM2.0), 8xAF (HDR/SM3.0)
www.futuremark.com

Half-Life 2

Canals custom timedemo, 4xAA, 8xAF, all details highest, HDR off
www.half-life2.com

Splinter Cell: Chaos Theory
Lighthouse Demo, Shader Model 3.0, 8xAF, shadow resolution high, all features on
www.splintercell3.com

X3 Rolling Demo

High settings, auto quality control disabled, glow enabled, 4xAA, 8xAF
www.egosoft.com/games/x3/info_en.php

Call of Duty 2

Hill 40 – Defend custom timedemo, 4xAA, 8xAF, all options highest
www.callofduty2.com

Quake 4

High quality, 4xAA, 8xAF, Multiple CPU support, all options highest
www.quake4game.com

Subsystems

HDTach

www.simplissoftware.com

LAME MT

softlab.technion.ac.il/project/LAME/html/lame.html

VirtualDubMod

virtualdubmod.sf.net

SuperPi Mod

www.xtremesystems.com/pi

Cinebench

www.cinebench.com

SiSoft Sandra

www.sisoftware.co.uk

Everest

www.lavalys.com

Others

DisplayMate

www.displaymate.com

ATI Tool www.techpowerup.com/atitool

RivaTuner

www.guru3d.com/rivatuner

FRAPS

www.fraps.com

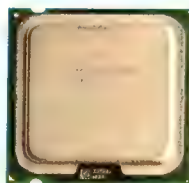
CPU-Z

www.cpuid.com

Stress Prime 2004 Orthos
sp2004.fre3.com

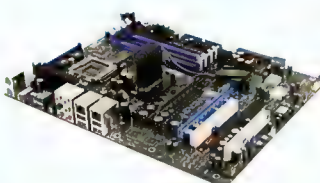
ATOMICBENCH Our standard hardware that gets regular labs lovin'.

intel



▲ Intel Core 2 Duo X6800

EVGA



▲ EVGA 680i SLI

OCZ Technology



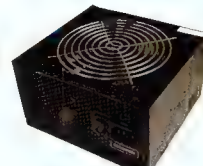
▲ 2GB OCZ Flex XLC PC2-9200

WD Western Digital



▲ WD 1500ADFD

PC Case Gear



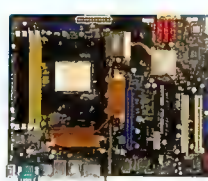
▲ Seasonic S12 600W

AMD



▲ AMD Athlon 64 FX-62

ASUS



▲ ASUS M2N32-SLI Deluxe

OCZ Technology



▲ 2GB OCZ Flex XLC PC2-9200

DELL



▲ Dell 2405FPW

ASUS



▲ ASUS 8800GTX



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2006

IN WIN NEWS

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In Win Development Inc. devotes to development and the innovation of PC cases. We provide the users with the best integration formula. F430, one of Xtreme Series, is featured with elegant design, advanced thermal solution, safe system environment, excellent expandability, and easy installation. It is a high efficiency machine with innovative beauty and technology.

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Utilizing an advanced spray-painting process usually reserved for high performance automobiles, the F430's plastic is rendered in the high gloss of metallic automobile paint, express the spirit of cutting-edge racecar design!

Automobile-style bumpers and dual intake vents—

Front fan intakes, concealed beneath bumpers, guide air down into the intake vents on both sides of the case. High-efficiency aerodynamics have been utilized to control air volume and speed, creating a uniquely effective system of heat dissipation.

The lifelike sounds of high-speed performance

Push the power "START ENGINE" switch, and prepare for an adrenaline rush of the engine revving up on the F430. Volume of the ignition can be even adjusted to your preference!

High-efficiency 12cm ceramic fan—

The F430 is equipped with a high-efficiency 12cm ceramic fan. The ceramic fan operates silently, can withstand high temperatures, and provides long-lasting performance.

Excellent Thermal Solution—

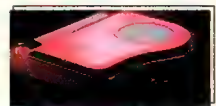
The worldwide unique patented design of Smart-3D air duct (5 levels of vertical adjustable depth, 11 levels of horizontal movements). Boosting heat dissipating to another level.

Ergonomic Design—

Screw-free Front Panel & Side Panels - for easy removal and installation. Safe installation with no sharp edges or debris.



In-Win's Xtreme Series F430 chassis brings race-car looks—including a multi-coat automotive paint glossy finish (available in red, black or orange)—and exceptional features together in one slick package. The unit is constructed of 0.8mm Japanese steel for stability and durability, and features folded edges to reduce the risk of injury when you assemble your PC. There's also plenty of room for expansion, with four 5.25-inch and five 3.5-inch (two internal) drive bays.



For ventilation, there's In-Win's unique patented Smart-3D UniDuct side panel that adjusts to position the duct directly over the CPU. The F430 is also equipped with a high-efficiency 12cm ceramic rear fan. The ceramic fan operates silently, can withstand high temperatures, and provides long-lasting performance. Additionally, there are reserved 8cm fan ventilation holes on the front panel (the rear ventilation holes equipped a 12cm ceramic fan). One cool feature: when you turn on the system, the case plays the sound of a race car's engine starting, with adjustable volume. For gamers who want their system to look as cool as it plays, the F430 is the way to go.

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GAMING MICE, KEYBOARDS AND PADS

Craig Simms played until his hands bled to find the perfect combo of peripherals to maximise your game.

The way we interface with our computer shapes our experience – the easier and more natural it is, the better. In an effort to increase the enjoyment of those all around, *Atomic* has gathered up some of the best keyboards, mice and mousepads and put them to the test so you too can enjoy your time on your PC.

Now when we say 'test', obviously judging the aforementioned products is a highly subjective matter. We thoroughly recommend you try out all products yourself before purchasing, if you're able to.

How we tested

For the mouse testing we performed a series of standard Windows tasks such as minimising, maximising, moving quickly between buttons, and positioning the cursor within a text field. After this we fired up S.T.A.L.K.E.R and spent a few minutes in game to see how the mouse went. Software was of course investigated for its options and usefulness.

Keyboard testing was done via typing over a period of 10 minutes, once again also paying attention to the software provided.

Finally the mousemats were tested for response and accuracy in S.T.A.L.K.E.R using a Logitech G5. On to the contenders!



MOUSES



LOGITECH G5



Supplier **Logitech** Website www.logitech.com.au
Price **\$129.95** Street Price **\$79** Technology **Laser**
DPI **400/800/2000** Buttons **7**
Scroll **Vertical/horizontal** Wireless **No**

The new Logitech G5 revision does away with the rusted look, and adds a second thumb button for forward browsing rather than just the back button present on the original.

The custom weight system is far from a gimmick, allowing you to set the mouse up to your own perfecting standards. Accurate, accurate, accurate. Moves fast, but stops on a dime. The dpi can be increased by clicking the buttons under the scroll wheel.

Comfort is exceptionally high, but for right handers only. Left and right scroll is available, and is useful now that the speed/acceleration of the scroll is customisable.

The software is great with every button configurable, and you can add profiles to adjust mouse sensitivity automatically when a chosen executable is loaded. The king of mice.



SCORE **9.0**
OUT OF 10

LOGITECH G7

Supplier **Logitech** Website www.logitech.com.au
Price **\$179.95** Street Price **\$108** Technology **Laser**
DPI **400/800/2000** Buttons **6**
Scroll **Vertical/horizontal** Wireless **2.4GHz**

Ah, the G7. Wireless gaming at its best. Unlike the MX Revolution, there's no docking recharge station – you have to take the battery out of the mouse and insert it in the charging point. Fortunately there's a second battery included so you won't be caught out with a dead one. The battery sits in the same place as the G5's weight system does, so the weight isn't adjustable here.

Checking the battery on the mouse is dead easy too – just lift it up off the surface, and eventually the speed selector display becomes the battery charge display. Schmick.

Otherwise things are just as blissful as the G5, the only difference being the lack of wires, weighting system and the gloss finish instead of the matt.

Simply sublime.



SCORE **9.0**
OUT OF 10

CYBERSNIPA INTELLISCOPE

Supplier **Anyware** Website www.anyware.com.au
Price **\$59** Street Price **\$58** Technology **Laser**
DPI **1000/2400** Buttons **7**
Scroll **Vertical** Wireless **No**

The Intelliscope didn't register movement on the coarse side of the Razer eXactMat at all. In fact, the coarser the mousemat the worse the response was. Even on a smoother surface it didn't glide easily and seemed jittery in movement.

Interestingly CyberSnipa has managed to pull off a symmetrical moulded mouse, meaning it's fine for both right and left handed people. The left and right mouse buttons feel a little flimsy but they should last.

Clicking the 'I' button in the middle switches between red lights (1000dpi) and blue (2400dpi). The software allows reasonable customisation for the buttons.

Due to the poor feet you really feel as if there's a lack of control in games. Those on a budget would be better with Microsoft's entry-level Intellimouse.



SCORE **5.0**
OUT OF 10

RAZER DEATH ADDER

Supplier **Altech** Website www.altech.com.au Price **\$99** Street Price **\$80** Technology **Infrared**
DPI **450/900/1800** Buttons **5**
Scroll **Vertical** Wireless **No**

The Death Adder sure does have a weedy cable. It does however feel great in the hand, providing you're a righty. The Razer logo slowly pulses to a bright blue, though this can be turned off in the driver if it annoys.

While there's excellent accuracy, it doesn't glide anywhere near as well as the G5, giving it a staccato feel.

It can be switched between 450, 900 and 1800dpi, and the driver lets you overclock the USB polling rate. Up to five different button profiles can be saved and quick access is available by clicking the button on the bottom of the mouse. You can bind any keyboard key to the buttons, as well as macros for some super insanity. Even X and Y axis sensitivity is there.

On-the-fly sensitivity is packed in too, with 20 different levels accessible by simply holding the designated button, then scrolling up or down.



SCORE **8.5**
OUT OF 10

MICROSOFT HABU

Supplier **Microsoft** Website www.microsoft.com.au
Price **\$129.95** Street Price **\$100** Technology **Laser**
DPI **400/800/1600/2000** Buttons **7**
Scroll **Vertical** Wireless **No**

The Habu is broken for a lot of people. Hopefully Microsoft/Razer will have updated the firmware by the time you read this, but in order to get the drivers to work we had to insert a different mouse, install the Habu and Copperhead drivers, hold down the profile button on the bottom, plug it in, manually install the Freescale USB driver from the Habu install directory, run the Copperhead drivers and apply an updated Habu firmware through it, unplug the mouse, release the profile button and plug the mouse back in. Yay, drivers work!

Excusing that major SNAFU, the Habu is an Intellimouse Explorer 3.0 (IE3) with a laser engine, better build quality and Razer influence and software. It sits a bit lower than the IE3, and even has a pop out section where you can swap in a different set of side buttons to suit the positioning of your choice.

We refuse to rate the Habu on account of its broken nature. If Microsoft fixes the problem, it's definitely worth a 9.



MICROSOFT INTELLIMOUSE

Supplier **Microsoft** Website www.microsoft.com.au
Price **\$69** Street Price **\$56** Technology **Infrared**
DPI **450** Buttons **5**
Scroll **Vertical** Wireless **No**

The Intellimouse Explorer 3.0 (IE3) may have been the first true gaming mouse, but this re-release shows its clacking scroll wheel, squishy side buttons and lack of dpi switching relegates it firmly to the days of yore. Having to increase the 'pointer speed' through the Windows control panel and then up it again in S.T.A.L.K.E.R damned it further. There's even a 'Precision Booster' in the software that can drop the speed of the mouse for more accurate pointing.

Expecting average performance, we ran around the game world – to complete bliss. The IE3 floated over the mouse pad gracefully, with seamless movement on the screen.

The IE3 certainly isn't up to today's build standards, but the gaming quality is still there.



SCORE **7.0**
OUT OF 10

CYBERSNIPA S.W.A.T.

Supplier **Anyware** Website www.anyware.com.au
 Price **\$58.95** Street Price **\$59** Technology **Laser**
 DPI **800/1600** Buttons **7**
 Scroll **Vertical** Wireless **No**

You'd think with a less flashy layout and slower speed that the S.W.A.T. would be worse than the Intelliscope – not so.

It actually feels a lot more solid. So solid, that to its detriment the buttons actually resist being pressed down, making it difficult to double click, let alone have hair trigger reactions in games. There are two speed modes available thanks to a light-up button on the body – 800 and 1600dpi. Like the Razers you can set up macros on the S.W.A.T., and that complexity is all the drivers offer – no customised buttons at all.

Still it's a cheap and effective mouse. However, we would still recommend the base level Intelliscope over it – and you can pick one up for just \$20 OEM.



SCORE **6.0**
OUT OF 10

RAZER COPPERHEAD

Supplier **ProGamer** Website www.progamer.com.au
 Price **\$149** Street Price **\$72** Technology **Laser**
 DPI **400/800/1600/2000** Buttons **7**
 Scroll **Vertical** Wireless **No**

The Copperhead has more than served its time in the market, but it continues to be used. This is down to one reason – quite simply it's a good mouse.

The Copperhead has two buttons on both sides and is ambidextrous, unlike the Death Adder and Habu. This fact alone is one of the major wins for the Copperhead.

It's lit down the side and has a Razer logo on the top, available in red, green and blue lights.

Gaming is a delight as it seems to be with all Razer mice, and it appears to have less heft to it than the Death Adder and Habu. Software is of course divine.

If you're a lefty, don't go past this mouse. Righties may want to look at the other Logitech or Razer offerings.



SCORE **8.0**
OUT OF 10

KEYBOARDS

LOGITECH G15



Supplier **Logitech** Website www.logitech.com.au
 Price **\$169.95** Street Price **\$103** Connection **USB**

The keys on the Logitech are slightly cushioned, dulling the impact of the stroke. There are 18 dedicated function keys on the left – for keystrokes or macros – with three shift modes to give a total of 54 custom keys. And then you can load profiles per game...

The macros aren't as limited as the Tarantula – we presume there's a limit in there somewhere, but we haven't hit it yet.

The display on top alternates between the time, CPU/RAM stats, a countdown timer/stopwatch, POP monitor and media display for your favourite media player. Heck, you can even download custom apps to get feedback from games, run a virtual pet, FRAPS, or code your own.

Two USB ports sit at the back, the keyboard can have lights on or off, and media player and volume controls are present.

This is the ultimate gamer keyboard. Note that older revisions have problems with the paint on the keys being rubbed off.



SCORE **9.0**
OUT OF 10

RAZER TARANTULA

Supplier **Altech** Website www.altech.com.au
 Price **\$169** Street Price **\$129** Connection **USB**

The Tarantula doesn't lend itself to particularly speedy typing – most likely because everything feels so damn close together and the throw of the keys is a little short. The piano black styling is also a massive fingerprint magnet – an odd choice for a product whose main function is to be touched.

Like the G15, two USB ports are available at the top of the keyboard – unlike the G15 though, you lose two USB ports at the back of your machine, so rather than gaining one USB port, you're simply shifting things a little closer to your fingers. There's also a passthrough for headphones and a microphone.

Just like the G15, profiles can be stored – up to 100! – for the 10 custom keys, which can be programmed for macros capable of holding 16 instructions.

Unlike the Razer mice, there seems to be no way to turn off the glow on this keyboard.



SCORE **7.0**
OUT OF 10

ZBOARD

Supplier **Mittoni** Website www.mittoni.com.au
 Price **\$79**; each extra layout **\$39** Connection **USB**

First things first – no sane individual would use the default Zboard layout for ordinary use – the keys are miles apart, it's a nightmare to find anything and buttons that should ideally be bigger like the Backspace key are tiny.

The driver is an extraordinarily bloated 64.2MB, we're assuming because it includes graphics for every add-in layout, rather than just showing the keys. Installing the WoW keyboard layout was a lot better, although many of the key buttons like Enter, Space and Backspace needed to be thumped to register properly. Despite the quick access keys for custom games, it's difficult to see this board actually helping with your gaming due to the poor response of the keys.

Three save profiles are offered, although it seems to be impossible to switch between them via the keyboard – the control panel needs to be loaded. There are two USB ports at the top of the board.

Buy something else.



SCORE **4.0**
OUT OF 10

SAITEK ECLIPSE II

Supplier **PC Case Gear** Website pccasegear.com.au
 Price **\$109** Street Price **\$109** Connection **USB**

The Eclipse II is one of the few keyboards left on the market that doesn't come with oodles and oodles of custom keys, and frankly we're glad for it.

About as custom as it gets is media player controls, a button to switch between blue, red and purple backlights and a dimmer for said backlights.

The keys are a little bit on the mushy side, but you soon get used to it and it doesn't impede too much for the speed typist.

The build quality is excellent, making sure this keyboard should be around for a while to come.

There's really not too much else we have to say, bad or good, about the Eclipse II, which is honestly a good thing. Saitek has built a keyboard that delivers what it absolutely has to and does it well – keys for typing on.



SCORE **8.0**
OUT OF 10

HIPER CLAVIER SP EDITION

Supplier **PC Case Gear** Website pccasegear.com.au
 Price **\$69** Street Price **\$56** Connection **USB**

If you happen to like the extremely short throw of laptop keyboards, then Hiper's Clavier will appeal to you.

The strokes have been dulled a little bit to add a fraction more travel to the action, which works well. However, it's a bit bizarre to have Page Up/Down sitting by the right Alt button. Additionally the non-separated arrow keys are horizontally compressed, making them difficult for use in games should you need them. This also shrinks the number pad's 0 key into an unfamiliar position.

The custom buttons at the top need to be depressed a little too far to be comfortable, and it becomes apparent very quickly that this is designed for those who want to travel or keep things small.

If your primary motivation is gaming then you may want to look elsewhere, but if you're more worried about size then the Clavier is a quality product.



8.0
OUT OF 10

SAITEK ECLIPSE

Supplier **PC Case Gear** Website pccasegear.com.au
 Price **\$99** Street Price **\$80** Connection **USB**

The forerunner to the Eclipse II, it's apparent that Saitek has refined the design in its latter incarnation

– the keys are far too mushy in this version, and there's a little less flexibility again in the custom keys, giving only volume control and three different levels of backlighting intensity, in blue alone.

The oversized space bar present in both versions is a gift to the gamer let alone the typist, but overall we recommend you opt for the newer version.



7.0
OUT OF 10

STEELKEYS 6G

Supplier **ProGamer** Website www.progamer.com.au
 Price **\$179** Street Price **\$185** Connection **PS/2**

The Steelkeys 6G strives to be the best darn keyboard ever

– in which it gets reasonably close by simply following a traditional layout with no custom keys, even if the keys actually on the board are too clacky for their own good.

There's a significant weight behind the 6G, and it almost manages to capture the heft and quality exhibited by the old IBM-style keyboards of the '80s.

It has gold-plated connectors and is rated up to 60 million keystrokes, aiming to be the last keyboard you ever own.

A complete replacement set of keys are included but coloured grey, allowing you to prise off the existing ones and highlight vital keys, most likely WASD.

Unfortunately it also costs about \$190 – with a huge disparity in street prices at the time of writing – more than any sane person will ever spend so we wonder where the market is.

It is a very good keyboard indeed, but the insane price drives the score down.



7.5
OUT OF 10

MICROSOFT WIRELESS ENTERTAINMENT DT 7000

Supplier **Microsoft** Website www.microsoft.com.au
 Price **\$249.95** Street Price **\$217** Connection **USB**

Microsoft's Bluetooth keyboard is sexy. It has short throw keys like a laptop to keep a low profile as this also doubles as a Media Center keyboard. Although the function buttons look tiny, they're more sensors than buttons and are quite sensitive to the touch. A four-way directional pad sits to the top right, which you can either switch between directional arrow keys, or a touchpad-style mouse. Left and right mouse buttons are at the top left.

It's also ergonomic, but not in the bad, split keyboard way – it's simply curved with some keys bigger than others. The arrow keys have been horizontally shrunk but unlike the Hiper, this doesn't seem to get in the way of operation. The lack of a numpad may disturb some, although it's accessible by holding down a function key and hitting the appropriate letters on the right.

The included ambidextrous Wireless Laser Mouse 8000 is quite excellent and can sit on a rechargeable dock – if only the same could be said of the keyboard. About the only problem we can find with the mouse is that there are no detents in the scroll wheel – making changing weapons in games a chore.

It's a fair bit of money to slap down, but you get a lot of bang for your buck here.



8.0
OUT OF 10

MOUSEPADS

CYBERBNIPA TRACER

Supplier **Anyware**
 Website www.anyware.com.au
 Type **Rigid** Price **\$29.95** Street Price **\$30**
 Size **305 x 230 x 5mm**

The mouse slips on this pad quite effortlessly. It glows blue around the edges via a USB connection, and offers variable brightness. As gimmicky as it is, it sure does make your setup look cool.

It's also plenty big enough for fragging so you will want to rest your palm on the mat itself, rather than hanging over the edge.

8.0
OUT OF 10



FUNC F30.R

Supplier **Gamerzstuff**
 Website www.gamerzstuff.com.au
 Type **Floppy** Price **\$45** Street Price **\$45**
 Size **356 x 279 x 2mm**

The F30.R is large horizontally, but is only average vertically. It has a slightly rough artificial texture on top, with what seems like neoprene on the bottom.

It certainly wasn't as accurate as the other mousemats. The raised edge is a little sharp, and might give you grief – but the sheer size means your hand will likely stay on the mat anyway.

6.5
OUT OF 10



EVERGLIDE TITAN MONSTER

Supplier **Gamerzstuff**
 Website www.gamerzstuff.com.au
 Type **Floppy** Price **\$45** Street Price **\$45**
 Size **444 x 355 x 4.3mm**

Possibly the most gigantic mousemat ever. The mat is neoprene, so it's just like Everglide ripped it off the back of a surfer when he wasn't looking.

Although there's a much lower speed response than the hard surfaces, it's just as accurate – you just need to wind up the mouse speed a little.

Buy it if you have two mouses and only want one pad.

7.0
OUT OF 10



STEEL QCK+

Supplier **ProGamer**Website www.progamer.com.auType **Floppy** Price **\$50** Street Price **\$45**Size **450 x 400 x 2mm**

We were wrong. This one's even bigger than the Everglide Titan Monster.

It's much thinner though. It boasts a much higher response as well, bordering on the performance of the rigid mousemats.

If you prefer soft but with the abilities of hard (ooh-er), snap this up now.

SCORE 8.0
OUT OF 10



RAZER MANTIS CONTROL

Supplier **Altech**Website www.altech.com.auType **Floppy** Price **\$55** Street Price **\$25**Size **444 x 355 x 4.3mm**

In terms of size, the Everglide Titan Monster and the Razer Mantis Control must have been separated at birth.

It is another neoprene variant of mousemat, but with a coarser more grippy surface – nice if you like to feel your mouse scrape a little.

Quite accurate, but out-edged by the QCK+.

SCORE 7.5
OUT OF 10



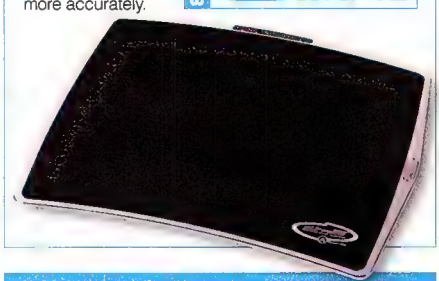
FUNG SURFACE 1030 ARCH

Supplier **PC Case Gear**Website www.pccasegear.com.auType **Rigid** Price **\$49.50** Street Price **\$60**Size **292 x 241 x 2mm**

The fUnc Surface 1030 Arch was the second coarsest of the hard mousemats, only falling to the Razer eXactmat.

Naturally, it was reasonably accurate on the coarse side, but – in direct opposition to every other mousemat – flipping it to the smooth side ended up making it perform even more accurately.

SCORE 8.0
OUT OF 10



STEELPAD 5L

Supplier **ProGamer**Website www.progamer.com.auType **Rigid** Price **\$70** Street Price **\$60**Size **380 x 280 x 3.8mm**

The 5L has a neoprene surface on a hard base, attempting to combine the best of both worlds.

Unfortunately it's also large, and the rigidity works against it in terms of having to clear enough space for it – it can't just flop off the edge of a desk like its competitors.

Its accuracy is up there with the QCK+, it's just a shame about the size.

SCORE 7.0
OUT OF 10



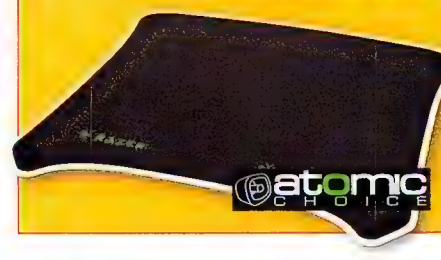
RAZER EXACTMAT X SPEED

Supplier **PC Case Gear**Website www.pccasegear.com.auType **Rigid** Price **\$39** Street Price **\$34**Size **265 x 330 x 2.5mm**

The eXactmat comes with an optional wrist rest. We find this removes flexibility during intense gaming sessions, but each to his own.

One side is smooth, although this seems to be a little loose with the response in games. The other side is quite coarse, and a lot more responsive and accurate. The size is just right too.

SCORE 8.5
OUT OF 10



RAZER PRO SOLUTIONS

Supplier **PC Case Gear**Website www.pccasegear.com.auType **Rigid** Price **\$45** Street Price **\$34**Size **265 x 330 x 2.5mm**

The same shape and size as the eXactmat, but without the wrist rest.

The difference between the coarse and smooth sides is also significantly more subtle, essentially being 'smooth' and 'smoother'. While the smoother side seemed to drift a bit too much, the smooth side seemed just right for accurate play.

SCORE 7.5
OUT OF 10



CONCLUSION

So what's Atomic's perfect setup? A Logitech G5 for the mouse, Logitech G15 for the keyboard and a Razer eXactmat. If you prefer a floppy mousemat, then the Steel QCK+ is for you. These choices should keep you fragging happily until the cows come home, while also performing to an exemplary level in day-to-day desktop tasks.

Of course as stated before this is an entirely subjective choice – while the mice are a little easier to test objectively, mousemats and keyboards are 100 percent down to personal tastes.

All three categories have come a long way since the days of the 3M Precision Mousing Surface and original Intellimouse Explorer 3.0 in the mid-to-late '90s, although we reckon for value and longevity you still can't beat one of those 20-year-old battleship IBM Model M keyboards that take a small nuke to destroy. You can still order one today from obscure sites on the Internet – Google should be able to help you find one quickly.

Still the G15 is a more than adequate fill-in for the ancient Model M keyboards, and we look forward to seeing the advancements in our interface tools in the years to come.

Are there likely to be any more improvements in this field? We'd like to hazard a guess, but as this area seems to update slower than even hard drive speed, we can't even begin to imagine – presumably we'll get better sensing technology than laser eventually, but who can tell what that will be? Whether we'll ever hit a *Minority Report* level of interactivity is

“ Presumably we'll get better sensing tech than laser, but who can tell what that will be? ”

questionable – it simply doesn't offer a fine enough accuracy compared to a mouse, which for the last 20 years really has been the zenith of inputs. Perhaps we'll finally entertain ourselves in a fully immersive 3D environment like *Star Trek's* HoloDeck, which by that time all pointing devices will be, if you can excuse the pun, pointless. ☺

Ozaki iHorn ▶

Price \$35 Supplier Protac
Website www.protac.com.au

Yes, a crude joke awaits in the name and for the sake of decency, we'll leave said activity as an exercise for the reader. The speaker itself however is far from crude and puts out a surprising amount of bass, in spite of what a visual appraisal of its construction would suggest. If you're looking for a portable speaker that's both functional and funky, you could do a lot worse than the iHorn – like a bowl and a pair of magnets, say.



◀ KWorld DVB-T 320U digital TV tuner

Price \$105 Supplier Rectron Website www.rectron.com.au

Just plug it into your nearest USB 2.0 port and the world of digital TV is yours. If you don't already have something like Media Center installed, this baby comes with KWorld's HyperMedia software, which includes MPEG editing and conversion, and DVD burning facilities. You also get a remote! What value!

OZAKI iBand ▶

Price \$TBA Supplier Protac Website www.protac.com.au

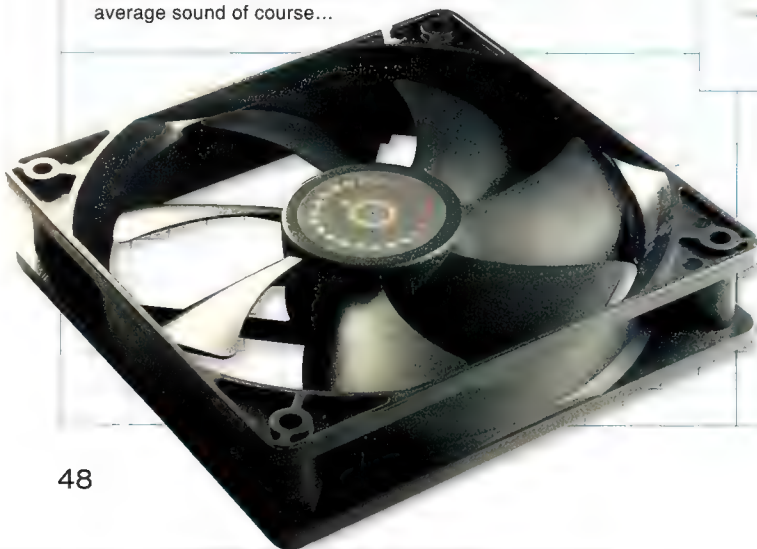
Really this device should be called a YAIA, otherwise known as 'Yet Another iPod Accessory'. Hey, it's where the money is, so we can't really blame them for pumping these things out. Like most iPod speaker docks, you can easily whack your player into the provided input plug, and it'll output music through to the external speakers transforming your portable MP3 device into a home entertainment system. As long as you don't mind the average sound of course...



◀ Cooler Master PWM fans

Price \$TBA Supplier Cooler Master
Website www.coolermaster.com.au

Need some fans to use with your Cooler Master Wind Rider, or perhaps just need additional cooling for your case? Then look no further than Cooler Master's own hardware. All sorts of sizes are available including 120mm, 92mm and 80mm, and every fan uses a ball bearing design, so you don't have to worry about them dying a month in from purchase. They're also black, just like every other case fan on the market!





◀ OCZ Mega-Kart 8GB

Price \$210 Supplier AustraliaIT
Website www.australiait.com.au

Will external hard drives be superseded by insanely big portable flash drives like the OCZ Mega-Kart featured here? More than likely, when you consider that flash drives are faster, smaller (in dimensions) and lighter, hard drives can really only compete on the longevity and capacity fronts. Looking at the 8GB of storage on this thing though, we're not sure HDDs will retain that advantage for much longer. If you do transport such voluminous amounts of data on a regular basis, then this may be exactly what you need.

Xbox 360 Wireless Controller for Windows ▶

Price \$89.95

Supplier Microsoft
Website

www.microsoft.com.au

Let's face it – the Xbox 360 controller is actually pretty good. It's a shame that you can't use it with your PC for all those console ports. Oh wait, yes you can. Microsoft now has this wireless controller pack available for Windows. It's really just your basic Xbox 360 controller – the special part of the package is the USB dongle receiver. Now all we need is an Xbox 360



◀ Flexiglow Cyber Snipa Game Pad V2

Price \$70 Supplier Anyware
Website www.anyware.com.au

Hardly a necessary accessory for the gamer, but an interesting one nonetheless. Essentially the Cyber Snipa places the most-used keys in easy reach, with directional keys taking up a sizable amount of real estate. Keys 1-9 are actually much easier to get to than on a standard keyboard.



Cooler Master Wind Rider ▶

Price \$TBA Supplier Cooler Master Website www.coolermaster.com.tw

Fans of the anime *Eureka Seven* will sadly have to look elsewhere for their stratospheric skateboarding paraphernalia. What the Wind Rider does do is intelligently control up to six Pulse Width Modulation (PWM) fans to improve both the energy and cooling efficiency of your entire system. Kind of takes the fun out of it doing it yourself though.



ASUS recommends Windows® XP Media Center Edition

GAMING WARRIOR

for virtual enjoyment



Centrino®
Duo

Core™2 Duo
inside™



Let's Game

Powerful High-Speed Performance for Virtual Enjoyment Anywhere

The ASUS G1 and G2 notebook series redefine mobile gaming with advance graphics solutions, exclusive display technologies and unique design details. With Direct Flash sidelights, gaming spirit is shared when DirectX 9 support is activated for graphic intense moments. Get a boost and bring the game on anywhere! ASUS G1 and G2 are powered by Intel® Centrino® Duo Mobile Technology. www.asus.com.au



ASUS Direct Messenger
Information side display updates IM, system status and reminder alerts with zero distraction.



Gaming Hot Keys
The A, W, S and D key are especially marked for convenient access at one glance.



Wireless Video Communication
Built-in high-resolution webcam and speaker allows wire-free video conferencing anywhere without the hassle of tangling wires.



Sult of Armor
The in-mold decorated cover surface provides sturdy protection to the LCD screen and also prevents the paint from chipping off.



G1 Gaming Package (G1 + Backpack + Mouse)



G2 Gaming Package (G2 + Backpack + Mouse)

Gaming Notebook Series- G1/G2

Intel® Centrino® Duo Mobile Technology
- Intel® Core™ 2 Duo Processor T7200
(2.0 GHz, 2MB L2 Cache, 667 MHz)
- Mobile Intel® 945PM Express Chipset
- Intel® PRO/Wireless 3945ABG/BG Network Connection
Microsoft® Windows® XP Professional
2 x 1GB DDR2 667MHz
17.1" WXGA ColourShine LCD (G2)
15.4" WXGA ColourShine LCD (G1),
ASUS Splendid Video Intelligence Technology
ATI Mobility® Radeon® X1700 (G2)
NVIDIA GeForce Go7700SE (G1)
120GB HDD SATA 5400
1.3 Mega-Pixel web-cam

ASUS®
Rock Solid · Heart Touching

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Gigabyte GA-N680SLI-DQ6

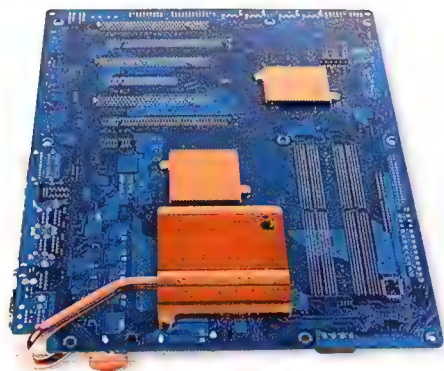
Last time Craig Simms checked, Gigabyte loved Quad. It still does.

SPECIFICATIONS

Price \$540 **Street Price** \$481
Supplier Gigabyte
Website www.gigabyte.com.tw
Specifications Socket 775; nForce 680i; 4x GB Ethernet; 10x SATA; 2x PCI-E x16; 1x PCI-E x8; 3x PCI; 1x PCI-E x1; IDE; FDD; mini-FireWire; optical S/PDIF; serial port; silent pipe solution.

Given the exemplary performance of Gigabyte's 965 solutions, we've been expecting its 680i contribution for a while now. Suddenly and unexpectedly it turned up – a sledge hammer blow to the face of all competition, this thing was designed with the idea that just like Sam and Fuzzy's robot NDA enforcer, overkill is just one of its many modes.

If the four Gigabit Ethernet ports – two Marvel, two NVIDIA – won't convince you, then the 10 SATA ports – six controlled by NVIDIA's MCH, the remaining four by two rebranded JMiron controllers – certainly will. The four eSATA ports provided on two separate expansion brackets and their associated cabling serves to seal the deal, with a side order of four SATA cables,



▲ Heatsinks on the bottom at first seem problematic, but can be easily removed.

“This board is for a very exclusive market, especially considering the heinous price.”

one FDD, one HDD, an SLI bridge and an SLI retention bracket.

We'd love to find a feasible reason for all the network cables and SATA ports – but all we can think of is a ridiculously traffic-laden storage system with several unique volumes present. You'd want to throw in a quad-core chip and a pair of 8800GTXs just to do the board justice. Perhaps the extra SATA ports could also be there so the eSATA expansion brackets steal nothing away. But still, this board is for a very exclusive part of the market, especially considering the heinous price. Amusingly, it's still cheaper than ASUS's Striker, despite the bucketload of extra features.

The BIOS is certainly flexible enough, although it complies to Gigabyte's annoying policy on hiding decent overclocking menus, requiring you to hit Ctrl+F1 at the main screen. After this is done, access to Advanced Chipset Features, such as caching the system BIOS, GPU Ex and LinkBoost, and RAM timings are

unlocked. Once again we mourn the non-use of NVIDIA's own BIOS, but we suppose the vendors have to differentiate themselves somehow.

Despite the 680i's well known overheating northbridge there is no additional fan included. While Gigabyte's heatpipe solution is definitely excellent, the northbridge held us back in the overclocking stakes, only managing to reach 478MHz Orthos stable. While this is still an excellent result, the 965s on average perform better, once again highlighting that you'd only buy an NVIDIA solution if you wanted SLI.

A Dolby Digital-capable Realtek ALC888 chip is included for 7.1 sound and the usual smattering of I/O ports sit at the back – the differences being a mini-FireWire port in preference to coax S/PDIF, and while the parallel port is gone the serial remains.

Gigabyte has continued with its solid capacitors, and considering it has done incredibly well in the market it looks set to continue using them from the top of its range right through to the bottom. This is a good thing, and significantly more reliable than the standard caps still found on most boards.

At first appearances the 'CrazyCool 2' heatsink attached under the socket seems to negate the use of CPU HSFs with custom backplates – however this is removed easily enough with judicious application of a screwdriver and thumbs.

Performance was on par with other 680i and 965P solutions, but with the expected price we just can't find a reason why this is worth it, short of bragging rights.

Buy it if your grandmother is coated in gold.

Gigabyte GA-N680SLI-DQ6	
Everest Memory Read (MB/s)	7332
Everest Memory Write (MB/s)	4886
Everest Memory Latency (ns)	54.5
wPrime 32MB (s)	29.89
SuperPiMod 1.5	1mins 45.406s
3DMark06 (3DMarks)	11844

SCORE **8.0** OUT OF 10

Samsung SyncMaster 305T

Craig Simms reckons this 305 fits to a T.

SPECIFICATIONS

Price **\$2499** Street Price **\$2499**

Supplier **Samsung**

Website **www.samsung.com.au**

Specifications **30"; 2560 x 1600;**

300cd/m²; 1000:1 contrast ratio;

6ms G2G; 4x USB; DVI only.

Everyone has a 30" now. Well not everyone, it's pretty much Dell, HP, Apple and Samsung, but that's markedly better from the original Dell and Apple options. Things are generally getting better too in terms of display quality, with Dell and HP currently using the same panel – the S-IPS based LG LM300WQ1 – while Apple lags on an older model – the LG LM300W01 – although an update is expected soon. So it's nice to see Samsung come along and bring its own S-PVA LTM300M1 panel to the mix. We wonder if Dell will switch its 30" over to S-PVA soon for cheaper production, as has been the tendency in the past.

Of course this is likely not to please one audience – the pro-gamer – as there's been a lot of talk about input lag on S-PVA screens. Input lag is the amount of time it takes between the monitor receiving an image and displaying an image. This gives a feeling of lag from the time when you move the mouse, and your viewpoint changes or reaction is shown onscreen, and may even appear as if there's been a slight audio desynch. This is highly disconcerting for twitch reaction gamers, and generally occurs on response time accelerated monitors. While we didn't notice anything that could be considered detrimental, hardcore gamers would be best playing it safe and going with the HP or the Dell to negate any possible effects for their large screen pawning.

Height, tilt and swivel options are available, although both Dell and HP offer better stands and more manageable height adjustment, with the



HP giving a superior experience over all. Unlike other monitors, the casing seemed to be a little tight around the screen itself – the corners being pinched by the fascia and slightly darkening as a result. Image viewing angles were not as good as the HP.

Sadly like all the huge bastard monitors out there, Samsung's does not have an OSD, giving us only power and brightness controls, and leaving the rest to be managed from the video card's control panel. While this is acceptable, it's still not as accessible as simply doing things through the monitor itself. So, as before, we don't understand the lack of menu here.

Also like almost every other 30" monitor it only has a single DVI input – HP's solution manages to take three DVI connections, although to be honest we'd prefer some component and HDMI inputs and the ability to set hardware scaling, to allow us to turn the monster monitors into a useful TV as well.

At this size, convergence is surely king. For now though, you're going to have to invest in your

own upscalers and perhaps a few converters to get the digital signal you require.

Firing up the DisplayMate tests on our standard test bench complete with 8800GTX, the Samsung edged out its competitors – being able to display all one to 255 shades in the greyscale test, and providing sumptuous colour ramps and gradients. HP and Dell are only able to offer four to 251, which is still a good range, but as a result the Samsung's images should be able to pack in more subtle colour shifts, with dark scenes particularly benefiting.

As usual gaming and movies were great, our 1080p standard sample looking nice and vibrant, if a little stretched at 2560 x 1600, while Quake 4 was just as lovely.

Samsung has entered the game at a very high mark, its S-PVA panel giving it a slight price and image advantage over its competitors. Still, if you're a pro-gamer rather than a digital artist or photographer, need more inputs or simply prefer a better build quality, the HP would be a superior choice.



SCORE **8.0** OUT OF 10

HP LP3065

David Field goes a screen too far.

SPECIFICATIONS

Price **\$2999** Street Price **\$2718**
 Supplier **HP**
 Website **www.hp.com.au**
 Specifications **30" LCD;**
2560 x 1600 native resolution;
three dual-link DVI-D inputs;
1000:1 contrast ratio;
300 cd/m².

A new segment in the monitor market has emerged, and it is literally, a sight to behold.

Back in 2004 you could only buy one 30" monitor – from Apple – and this was aimed squarely at the design market. Now, the other major players – Dell, Samsung and now HP – are all offering 30" displays to the consumer market. We would have expected to see these displays being provided by companies like Eizo, Lacie and other organisations specialising in the professional domain.

The HP LP3065 uses the same S-IPS panel as Dell's most recent 30" monitor. It also uses a WCCFL backlight that reproduces 92 percent of the NTSC colour gamut. The beefy backlight provides a purer white – the number of colours exceeding that of normal backlights – giving the transistors in the panel more colours to filter. The end result is a more subdued and accurate image.

It's hardly surprising that the HP gave us the same DisplayMate results as the Dell: blacks went down to four before becoming indiscernible from each other and the whites went up to 251 before blowing out. Gradients were excellent with minimal banding, however, like the Dell, we could

You can switch between them with the dedicated source button on the front of the unobtrusive bezel. There are two DVI-D cables in the box to sweeten the deal too.

Like all 30" monitors we've seen so far, there are no VGA, composite, S-Video or component

“There aren't any card readers built in, which is surprising, although the LP3065 makes up for this with its party trick: not one, but three dual-link DVI inputs.”

see a purple tinge while benchmarking that you wouldn't notice in everyday use. It's bright too, thanks to the 1000:1 contrast ratio, and there is no bleeding at the edges.

Four USB ports are hidden behind the left side of the unobtrusive bezel. There aren't any card readers built in – which is surprising, because they are popping up everywhere else – although the LP3065 makes up for this with its party trick: not one, but three dual-link DVI inputs.

connections for you to hook up consoles or other analogue sources. We've been told by HP that a scaler IC has to be built into the panel before we'll see that in any 30" display, so our wish may be granted in time, unless baby Jesus whips out the miracle wand.

You can't hijack the DVI ports to plug VGA connectors into the monitor with an adaptor either – or for that matter any DVI plug on any monitor – because the DVI standard just doesn't allow

it. The little pins around the flat connector of a DVI connector on video cards that carry the red, green, blue and horizontal synchronisation signals for VGA backwards compatibility are blocked off on the DVI connectors of monitors. You can use HDMI connectors with a converter, but as a rule you're limited to digital connections.

The controls on the bezel are limited to power, source and brightness. Colour controls are left to your video card, as there is no OSD. The stand gives you more play than the Dell – and far more than the Apple 30" Cinema HD – and there's an ingenious sliding lock mechanism on the back that doesn't make setup feel like it should be a two-man job.

At a hair under \$3000, it's a little pricier than the Dell, but it does offer more flexibility. Provided your hardware is up to the task of powering it, gaming is beautiful, with no noticeable blurriness and an unsurpassed sense of immersion – provided you don't understand or care about the words 'too big'.

SCORE **8.5** OUT OF 10

Enermax Infiniti 720W

Price \$299 Street Price \$282
Supplier ActionTec
Website www.actiontec.com.au
Specifications 720W; 82 percent efficiency; status light; 8-pin PCI-E power; 2x 6-pin PCI-E power; 3x 4-pin molex; 3x SATA; 1x fan.

Enermax sure makes some nice power supplies. Add the Infiniti 720W to the list.

Built like a small elephant attached to a rhinoceros who's building the brick shithouse in question, it also sports a 135mm transparent fan at the top. It's definitely not the quietest power supply we've put our auditory funnels up to, but the noise generated is low pitched enough to not annoy and will all but disappear in the realms of a case. Pure silence pundits though should look elsewhere.

It's modular, with the connections being shaped like a PCI-E power connector, but keyed with an empty socket at the top right.

The big feature of the Infiniti 720W is what Enermax amusingly calls 'Direct X 10' compatibility. What it comes down to is an updated PCI-E power connector that comes in eight pins rather than six. This will support newer graphics cards, of which the X2900XTX should be the first, featuring one eight-pin and one six-pin power connector.

The Infiniti won't however support dual 8800 GTXs unless you have a power adaptor handy

to convert some four-pin molexes over, as it only comes with three PCI-E power connectors in total. This shouldn't be an issue for most, as a majority of video cards come with one.

A handy status light sits on the back, that lights green for normal, orange for standby, and turns red, blinks and starts beeping when things go horribly wrong, to warn you in time before the smoke escapes.

Plugging in the nearby multimeter the 12V, 3.3V and 5V rails returned 12.25V, 3.35V and 5.15V respectively. Put under load by booting up 3DMark06 and setting it to 2560 x 1600, 8xAA and 16xAF, the power supply didn't budge at all, maintaining the exact same volume.

When you look at the price, \$300 is a good deal, putting it price-wise on par with OCZ's Evostream. For anyone but the most demanding of silent PC users it's a good choice, and we'd be more than happy to have one of these in our machines.  **CS**



SCORE
8.0
 OUT OF 10

OCZ Flex XLC 9200

Price \$859 Street Price \$876
Supplier Australia IT
Website www.australiat.com.au
Specifications 5-5-5-18 @ 1150MHz; water-cooled; aluminium ribbed heatsink.

So it's on. OCZ's Flex versus Corsair's Dominator. While the Dominator comes with its own fan array, OCZ has one-upped Corsair and included water-cooling sockets on these crazy industrial styled sticks. You'll have to provide your own water-cooling solution of course – OCZ just supplies the ability for you to add the RAM into an existing circuit.

We have no doubt that the water-cooling reduces the operational degrees, however considering that RAM can operate at high temperatures it probably won't help in the overclocking of the sticks themselves – more to just keep the ambient temperature of your entire machine down. Certainly during operation the sticks were easily touchable, even operating above 1200MHz and at 2.475v.

The Flex XLCs come at a chafingly-fast 9200 rating, or 1150MHz at 5-5-5-18. Yes, you'll pay through the nose for them, but that's some damn fast RAM.

The first port of call on the testing circuit was

the ASUS Commando to see how the sticks would go on an Intel 965-based board. While they happily ran at the rated speed, netting 8142MB/s, 5160MB/s and 56.0ns in Everest's read, write and latency tests respectively, the sticks refused to be clocked any higher. Giving up on the 965, we returned to our default EVGA 680i board for extra memory flexibility and got to tweaking.

While the same results were returned for the default speeds, using the unlinked mode we managed to push up to 1220MHz stable at the same timings, achieving 8263MB/s, 5549MB/s and 53.5ns. While we could push 1260MHz, the system was unfortunately not Orthos stable.

Going the other way we clocked down to 1066MHz at 4-4-4-10, yielding a slightly faster 8290MB/s, 5480MB/s and 50.6ns.

Deciding to tempt fate we clocked down even further to 800MHz, the gambit paying off as we attained a stunning 3-3-3-3 at 1T – let's just say that again – 1T – pushing our results to 9063MB/s, 5480MB/s and 48.7ns.

OCZ has done itself proud on some insanely

fast RAM. For the average user it's complete overkill, and they may as well save at least \$400 and get some cheaper kit – but if memory bandwidth means the world to you and you have a wad of cash smouldering a hole in your wallet, then you have no choice but to grab these sticks.  **CS**



atomic
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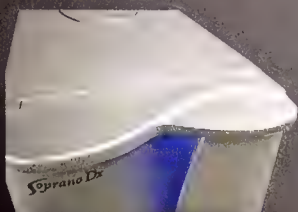
SCORE
9.0
 OUT OF 10

atomic

Soprano Dx

Dangerous curves

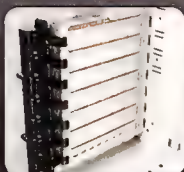
- Compatible with 12.2" graphics cards such as 8800GTX.
- 11 drive bays and 7 expansion slots.



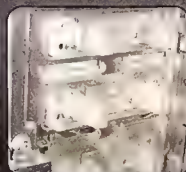
Curved aluminium front door with blue LED



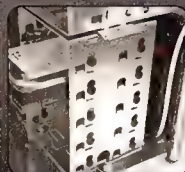
Silent 14cm front and 12cm rear fans for superb airflow



Venting holes in PCI slots provide increased cool air intake.



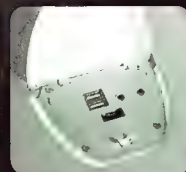
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USB 2.0 x 2, e-SATA connector x 1, HD audio

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Xigmatek AIO-S800DP

Price \$110 Street Price \$110
Supplier Below Zero
Website www.belowzero.net.au
Specifications Socket
478/775/754/939/940/AM2;
80mm 27.68-52.72cfm fan;
internally water-cooled.

We've seen some interesting heatsinks in our time, but this one possibly takes the cake, the plate and the candles as well.

Calling itself an all-in-one solution, the Xigmatek features a pump, aluminium radiator, 80mm 27.68 to 52.72cfm fan and coolant. Two power connectors are supplied – a three-pin for the coolant pump, and a four-pin for the Pulse Width Modulation (PWM) fan. PWM is a good thing, because while the pump is reasonably quiet, at full speed the included fan is a little loud for comfort. The coolant is covered for two years – in fact there's a sticker over the tank refill point that states that the warranty is void if it's removed.

Like all good coolers it's compatible with all the popular and not so popular sockets – 478, 775, 754, 939, 940 and AM2 are happily supported, with a reasonable custom mounting system that doesn't cause too much fuss and fortunately doesn't use Intel's rubbish twist lock mechanism.

At 840g it boxes in the same weight division as the larger tower coolers such as the Scythe

Infinity, Thermalright Ultra 120 and Tunix Tower, so with the extra water-cooling to help it out you'd hope it'd have an edge over its competitors. Unfortunately this isn't the case, even with the extra shiny smooth copper base included.

Attaching the Xigmatek to our heat generator Chernobyl and setting the dial to output a continuous 80W – as we have since the magazine's inception to have comparable results – it registered 47°C in an ambient temperature of 29°C, which is reasonable – but the Thermalright Ultra 120 does 4° cooler without the benefit of water at all, with the significantly quieter Scythe 120mm fan attached. In fact even the older Zalman CNPS9500, which isn't even a tower cooler does better, which doesn't bode well for the Xigmatek's prospects at appearing in users' machines any time soon.

While it's certainly exotic and performs okay, considering the weight we can't see a reason why you'd go for the Xigmatek over a decent air-cooled tower HSF, or even proper water-cooling. **CS**



SCORE **7.0**
OUT OF 10

KWorld DVB-T PE310 Plus PVR

Price \$170 Street Price \$170
Supplier Rectron
Website www.rectron.com.au
Specifications PCI-Express x1;
low-profile PCB; MPEG 1/2/4
recording; MCE compatible;
remote included.

KWorld's DVB-T PE310 Plus TV Instant PVR looks like every other TV tuner to hit the market in recent times. Except for the little plastic bit at the bottom, which gives away the PE310 as one of the few TV tuners that supports PCI-E x1.

The PE310 gets its PCI-Express x1 ability from the Philips SAA7162E chipset and also features two Philips TDA100046A ICs that allow simultaneous dual-channel viewing.

Featuring an analogue antenna input, digital antenna/FM input, AV in, remote sensor input for the remote control, a low-profile PCB, full-height bracket, and offering support for Windows XP MCE, the PE310 is ideal for larger HTPC enclosures as well as the average desktop beast. Oddly the package doesn't come with a half-height bracket despite the small size of the PCB itself, requiring you to source your own – something that as far as we're aware is impossible. The PE310 can also record video in MPEG 1/2/4 with the relevant codecs installed.

Unless you like admiring installation diagrams, the manual is extremely brief and can otherwise be avoided if you know how to install an expansion card with drivers.

The bundled viewing software includes basic file conversion, editing and scheduled recording functions, as well as the ever-present time-shifting feature. However, the software looks extremely dated and cluttered, as if it had been dragged from the '90s and in no way resembles the slick and clean intuitive interfaces we've come to expect from this type of software.

Once we set up through auto-tuning, the picture quality was good, although it can get a bit confusing when you're making your way around the poorly marked interface.

The PE310 is great if you desperately need to fill that unoccupied PCI-E x1 slot. Otherwise, KWorld really needs to bundle in some polished

software and a half-height bracket. For now just stick to using Win XP MCE. **DV**

SCORE **7.0**
OUT OF 10



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ASUS EN8800GTS 320MB

SPECS

Price **\$579** Street Price **\$486**
 Supplier **ASUS**
 Website **www.asus.com.tw**
 Specifications **320MB 320-bit**
GDDR3; 500MHz core;
1600MHz memory;
DirectX 10 compatible.

NVIDIA will soon announce the lower end of its 8x00 family in the form of the 8500 GT, 8600 GT and 8600 GTS, but until then the budget-minded have this little rocket to rely on for performance in DirectX 10.

The EN8800GTS 320MB is just that – an 8800 GTS that's had its memory halved. Unlike your grandmother this doesn't mean it'll forget things and start spilling yoghurt everywhere after a particularly hectic bingo session – just that it won't be able to handle ultra-sized textures or AA modes at high resolutions in games like Oblivion or Quake 4 as well as its better endowed brother. In everything else – heat, noise, size, stream processors – it's exactly the same. For those who have 22" monitors and below and are willing to sacrifice a little bit of texture detail, then this card should fit nicely.

In slightly older games with not so huge textures, it performs exactly the same as the 640MB – 3DMark06 coughing up 2563, 2005 and 1634 at 1280 x 1024, 1600 x 1200 and 1920 x 1200

respectively. Similarly, Half-Life 2 gave 160.43fps, 135.54fps and 120.67fps at the same resolutions.

More taxing games such as Oblivion broke out the differences though, with the 320MB's 71.61fps, 51.37fps, 38.13fps not matching the 640MB's 72.54fps, 58.27fps and 47.26fps in 1280 x 1024, 1600 x 1200 and 1920 x 1200 respectively. It's still a small difference, and most gamers won't care.

ASUS has even managed to be reasonably price competitive, while throwing in a copy of Ghost Recon: Advanced War Fighter, 3DMark06 Professional and a small leather CD wallet to boot, all packaged in their novelty-sized box along with the



usual DVI-to-D-Sub dongles and power adaptors.

While it's not suitable for running the newest super high performance games with insanely sized textures at crazy resolutions by pure virtue of its lower memory count, in terms of DirectX 10 this should keep the mainstream gamer pretty happy for some time indeed. **CS**

SCORE
8.0
 OUT OF 10

Steel Sound 4H

SPECS

Price **\$109** Street Price **\$101.50**
 Supplier **ProGamer Australia**
 Website **www.progamer.com.au**
 Specifications **Phones: 16-28kHz**
response; 40 ohm impedance;
110dB. Mic: 75-16kHz response; -
38dB sensitivity; 2k ohm impedance.

A few months back we had the pleasure of reviewing the Steel Sound 5H v2 as part of our gaming headphones roundup. It was one of the best in show, scoring well on all counts, so it is great to get a look at its little sibling, the 4H. For a little less money, how different could they be?

Right off the bat you can see the corner-cutting involved with bringing out a cheaper product.

The headband, cups, cable, and cushions seem to have seen a quality drop. The cable in particular is shorter – 1.8m rather than 1m plus 2m – and not the sexy cloth covered, single-sided arrangement that really makes a big difference to ease of use. The cushions seem a little less ergonomic, and the phones don't maintain overall comfort as long as the 5H does.

But this is nitpicking with something that is outstanding, and in its own right the 4H sits well. The same retractable microphone is here, which is one of the best in the game. A clip on the cable includes a volume control, which we can't say we'd ever use, and a mic level switch, which is a

good idea – three settings, high, low, and off.

The great news is the performance is very close to that of the 5H. Audio is clear, and the deep semi-open cups offer a great stage when compared to more 'portable' flat-cupped phones. For the stat fiends, we're talking 16 to 28kHz frequency response and 40 ohm impedance. The mic delivers 75 to 16kHz and being uni-directional it is a good idea to play around with it to find its clarity sweet spot.

This is a nice set of phones, but it isn't so much cheaper than the 5H v2 that you're getting good value. Audio performance is great, and if you only have this money available then the performance will not disappoint. We just worry you will all too soon be hit by upgrade envy when you encounter someone with the 5H. Vigilant use of the swear jar for a few weeks – or hours – should earn you the extra you need. **SB**



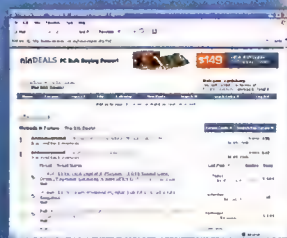
SCORE
7.0
 OUT OF 10

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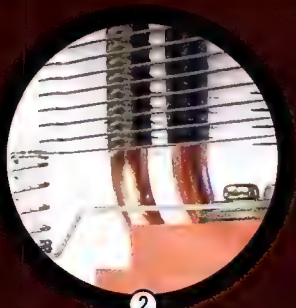
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2



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1

AM2

3



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Noctua NC-U6

- Chipset-Cooler
- 2 Dual-Heatpipes
- 29 aluminium cooling fins

Noctua NH-U12F

- 4 Dual Heatpipe CPU-Cooler
- 5000 cm² surface area, can be rotated 90°
- Noctua NF-S12 Fan, min. 8dB(A) with U.L.N.A.

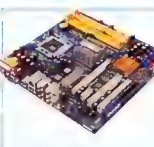
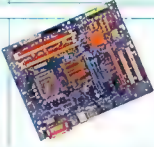
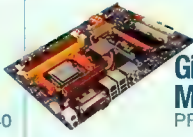
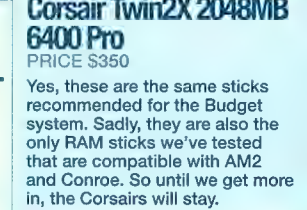
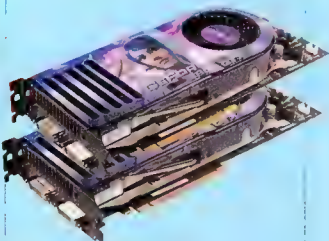
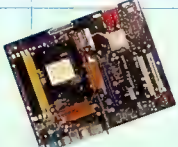
ATOMIC KITLOG

Our choice for
the best gear the
land has to offer

There's nothing sexier than new kit. And whether you need to horde your pennies (Budget), want the most power for your dollar (Performance) or own a small mansion and

a collection of sports cars (Extreme), we're here to help with this handy matrix of Atomic recommended products. You may find your needs fall between categories – that's okay,

just mix and match to suit your budget! Each piece of kit has been reviewed hands-on in Atomic, so if you want to learn more, look up the issue and page number listed.

	CPU's	Motherboards	Memory	Video cards
BUDGET I can't afford to eat... gimme gear!	 Intel Core 2 Duo PRICE \$280-\$840 Stretch a little further and buy yourself a Core 2 Duo – you'll be thanking yourself later. The E6300 is the cheap ticket to speed, at \$300.	 ASRock Conroe 945G-DV1 PRICE \$113 ASRock's budget board may be using old technology, but it runs the new stuff just fine, and can even overclock a little. <i>Reviewed in Issue 70 – Page 60</i>	 Corsair Twin2X 1024MB 6400 Pro PRICE \$198 Corsair has a history of providing nice, stable and fiery sticks of random access memory joy. These RAM sticks are EPP compliant, have low latency and are nicely overclockable. 800MHz of fun for everyone! <i>Reviewed in Issue 69 – Page 51</i>	 Powercolor X1950 Pro PRICE \$245 The X1950 Pro is nothing short of fantastic. Mind you, this could just as easily be the 7950GT, so watch this space in case the NVIDIA card drops in price. <i>Reviewed in Issue 71 – Page 47</i>
	 AMD Athlon 64 AM2 X2 PRICE \$160-740 Cheap CPUs are a wonderful thing, and the X2s are now wonderfully cheap. The 3600+ is your budget baby at about \$230.	 MSI K9N Neo F PRICE \$113 Excellent performance from a budget board, with plenty of legacy slots for upgraders. Don't expect to overclock though. <i>Reviewed in Issue 68 – Page 33</i>		
PERFORMANCE Hardware that bangs the best for buck.	 Intel Core 2 Duo PRICE \$280-840 Core 2 Duo – crazily fast, crazily cool, crazily affordable, overclockable like buggery. The E6400 is the best buy, at about \$400.	 Gigabyte GA-965P-DS3P PRICE \$204 The 965P-DS3P is a ridiculous overclocker that can't be ignored. Buy a low-end Core 2 and go nuts! <i>Reviewed in Issue 74 – Page 46</i>	 Corsair Twin2X 2048MB 6400 Pro PRICE \$350 Yes, these are the same sticks recommended for the Budget system. Sadly, they are also the only RAM sticks we've tested that are compatible with AM2 and Conroe. So until we get more in, the Corsairs will stay.	 GeForce 8800GTS 320MB PRICE \$410 DirectX 10 for the mainstream. 320MB is as good as 640MB in most situations – opt for the 640MB if you're going to play above 1600x1200. <i>Reviewed in Issue 76 – Page 58</i>
	 AMD Athlon 64 AM2 X2 PRICE \$160-740 The X2 series are still fantastic chips, and in the face of the Intel threat are now going for cheap. The 4600+ is your current sweet spot at about \$400.	 Gigabyte GA-M59SLI-S5 PRICE \$250 Gigabyte delivers yet another affordable, feature-filled wonder of the 21st century. <i>Reviewed in Issue 66 – Page 39</i>	 Corsair Twin2X 2048MB 6400 Pro PRICE \$350 Yes, these are the same sticks recommended for the Budget system. Sadly, they are also the only RAM sticks we've tested that are compatible with AM2 and Conroe. So until we get more in, the Corsairs will stay.	
EXTREME Gimme power. Money is no object.	 Intel Core 2 Quad QX6700 PRICE \$1390 It may be clocked slightly slower than the X6800, but it overclocks fine and has double the cores! <i>Reviewed in Issue 72 – Page 46</i>	 EVGA nForce 680i PRICE \$435 Stupidly over-featured and fast, if you've got the cash, then plonk it down here. <i>Reviewed in Issue 72 – Page 47</i>	 OCZ Flex XLC 9200 PRICE \$876 Crazy speed sticks that will also happily do 1T at 800MHz. If you're crazy, you can even water-cool them. <i>Reviewed in Issue 76 – Page 54</i>	 GeForce 8800GTX SLI PRICE \$810x2 The next generation is here, and it kicks arse. While we're still waiting for DX10 applications, for DX9 the thing utterly destroys the competition, providing you have a beastly CPU. <i>Reviewed in Issue 72 – Page 30</i>
	 AMD Athlon 64 FX-62 PRICE \$1180 Sadly gets beaten by a mid range Core 2 Duo, but still the top of AMD's pile. <i>Reviewed in Issue 66 – Page 39</i>	 ASUS M2N32 SLI Deluxe PRICE \$290 Perfection in a motherboard. Beautifully laid out and overclockable to boot. <i>Reviewed in Issue 68 – Page 35</i>		

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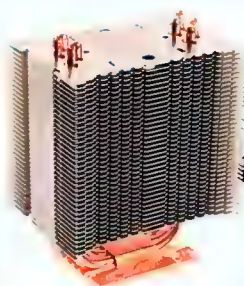
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Reviewed in Issue 72 - Page 42



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Super quiet and yet still fast, the 160GB Samsung offers excellent value for money.

Reviewed in Issue 69 - Page 40



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Reviewed in Issue 70 - Page 56



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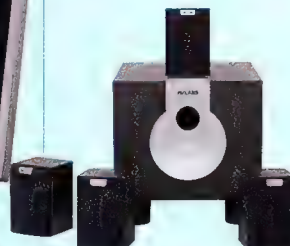
Reviewed in Issue 69 - Page 40



Samsung 244T
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Brilliance at 24", the 244T offers 6ms gaming, a wonderful gamut and more inputs than an alien hooker.

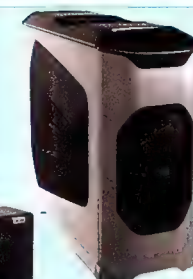
Reviewed in Issue 69 - Page 48



AVLabs AVL325
PRICE \$165

While it can't hold a candle to the Z-5500D, with a price this low there's no excuse not to jump to 5.1.

Reviewed in Issue 64 - Page 50



Cooler Master Stacker 830
PRICE \$290

Like the Stacker before it, this sensational Stacker stacks sumptuous specifications salaciously.

Reviewed in Issue 61 - Page 36

Asetek Vapochill Lightspeed
PRICE \$1020

Vapour phase change. Ooooh. Vapour. Phase. Change. No matter how many times you say it, it's still cool (pun!)

Reviewed in Issue 64 - Page 38



Western Digital Raptor WD1500AFD
PRICE \$330x2

Dear lord. The performance king hath cometh, short of whacking in a SCSI. Buy two and RAID 'em.

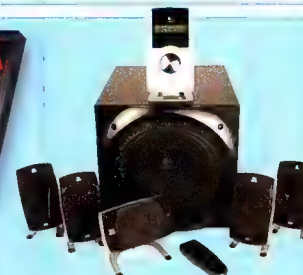
Reviewed in Issue 62 - Page 40



Hewlett Packard LP3065
PRICE \$2718

Thirty inches, 2560 x 1600, 8ms G2G. If you can handle the size and cost to run this massive beauty, you won't be disappointed.

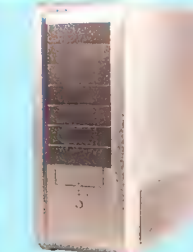
Reviewed in Issue 76 - Page 53



Logitech Z-5500D
PRICE \$430

Able to play the 'liquid gold' that is DTS 96KHz/24-bit, this 5.1 beast can wreck both home and hearing alike with equal impunity.

Reviewed in Issue 48 - Page 56



Silverstone TJ07
PRICE \$420

The Silverstone Temjin TJ07 is a huge hulking beast that shows you mean business in the finest style. Impeccable finish and plenty of room means win.

Reviewed in Issue 65 - Page 49

Cool-Trek Vostok
PRICE \$199

Until more extreme cooling systems come along that are AM2 compatible, this little kit will have to fill the gap. Make sure you get the updated mounting kit.

Reviewed in Issue 68 - Page 41

GROUND ZERO

Dan talks tech
like you've never
heard before



Great interface disasters

Daniel Rutter wants someone to create an interface he can use.

Computer users are accustomed to dumb user interfaces. Many, many applications 'just grew' from a simple v1.0 to a 50-times-bigger v8.76g, and the developers often just put new things where they fit. Many big software companies have dysfunctional user interface departments. Many small developers don't have such a department at all.

The text editor I'm writing this in is NoteTab Pro, which is generally very good but puts most – not all! – of its configuration options in a little window that contains no fewer than 17 tabs. Which actually isn't all that many by awful-interface standards. The old Interface Hall of Shame has some corkers at tinyurl.com/2fx3h3.

The tabs have many entirely straightforward and non-overlapping titles. Like 'Files' and 'Documents'. Or 'HTML Files' and 'Internet'. Not to mention 'General', which would I suppose be called 'Miscellaneous' except that was too long to fit.

This sort of thing is perfectly normal. Everybody does it, on Windows and Mac OS and definitely, definitely Linux. But once you learn a given interface, you're pretty much OK. You may still go nuts when you fat-finger a hotkey combination you never knew about and place a little bookmark in your document that you don't know how to remove, but by and large you're all right once you've climbed the learning curve.

Real interface disasters achieve more than this. They annoy you *every single time* you use them. When executed particularly stylishly, they actually completely *mystify* you every time, reducing you to precedent-free trial and error as you attempt to make the thing in question do what you want.

There are lots of non-standard Flash streaming video players that qualify here. They have one button for the play/pause function, but it's difficult to tell what state the player is in, when what you *want* it to do is silently download the video while you do something else so you don't have to wait for buffering.

Perhaps the play button turns into a pause button when you click it. But does that mean you're in the mode the symbol indicates, or does it mean you'll get the indicated mode if you click the button? The first famous program to have this problem was the 2000-vintage QuickTime Player – tinyurl.com/yu3tub.

Further examples are easy to find. What kind of idiot makes a car stereo with a tuning *knob* and volume *buttons*? Let 'em loose on the whole vehicle and you'd have an accelerator wheel and a steering pedal. Vending machines exist that can never dispense anything from column 10 or higher, because as soon as you ask for row 'C', for instance, and press '1' for the first digit of the column you want, you get product C1 (tinyurl.com/b8ec3).

Interfaces have been important for as long as people have been using tools, but they're becoming more and more important as the computer revolution continues.

We may or may not ever end up as machine-people full of tech to augment our mind, senses and muscles, but we're actually conceptually close to that state already. Most nerds, like the early version of Manfred in Charles Stross' *Accelerando*, already feel somewhat lost when we're away from our Internet teat.

We may not have those wonderfully newsworthy Net Withdrawal Symptoms, but we miss being able to dip into Wikipedia to fill gaps in our knowledge, or look up something on our blog to remind us how we solved a problem. Slow, strange chunks of our brains are already living in cyberspace.

User interfaces stand between our protein neurons and the silicon neurons of what I'd call 'our nascent exocortices', if that didn't sound so wanky. They're going to *keep* standing between those two things until we manage to come up with an interface that really is as simple as thinking. Which is not a development for which I recommend you hold your breath.

If the software you use is becoming part of your brain, then defects in that software, including bad interfaces, become a form of brain damage.

I bet you were already calling them that, without even knowing how accurate it's becoming.

It's just as well there's an interface between you and Dan's thoughts – it gets confusing in there.

dan@atomicmpc.com.au

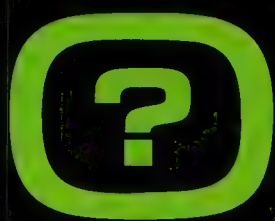


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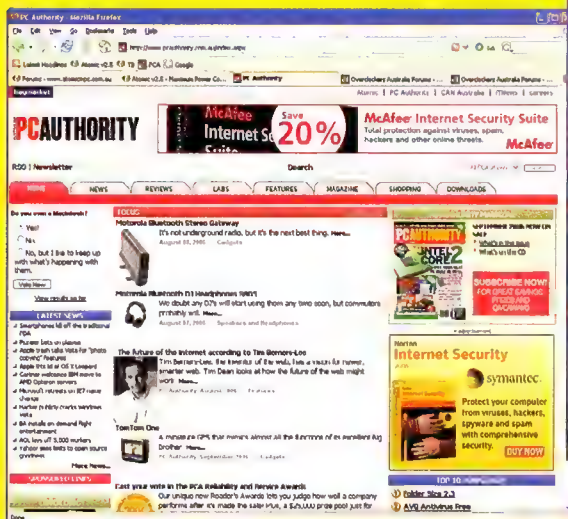
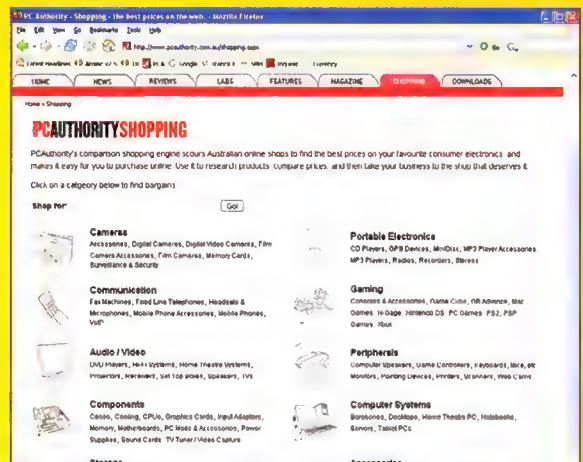
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GAMEPLAY

GAMES, GAMING AND GAMERS COVERED ATOMIC-STYLE

For the longest time, GSC Gameworld's S.T.A.L.K.E.R was looking to steal the vapourware crown from 3D Realm's Duke Nukem Forever. Then at E3 2006, we were shown a very playable build of Shadows of Chernobyl by THQ and all doubts were vanquished.

You'll be ecstatic to know that this issue features our review of this

eagerly anticipated title – and let's just say the results are satisfying like honey in tea, or a lap dance from Jessica Alba. Your choice.

There's a fair bit of military action this month too. Not only do we quash a Sahrani Liberation Army uprising in ArmA: Armed Assault but we also see if Kaos Studios can out-gun the mighty Battlefield.



GAMEPLAY CONTENTS

Engine Room: Frontlines: Fuel of War 68

What does it take these days to make a war shooter good? The guys that brought us Desert Combat know and we talk to them about it here.

Geekette 82

Girls in games are bad role models and Kate Inabinet tells you why.

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S.T.A.L.K.E.R Collector's Edition + 5 shot glass sets!

www.atomicmpc.com.au/competitions

GSC Gameworld's sci-fi, post-nuclear FPS/RPG is here and to celebrate, THQ has supplied us with a copy of the Collector's Edition along with five S.T.A.L.K.E.R shot glass sets. And we're giving them away to you guys. For details on how to enter, just visit the competitions URL above and hit the S.T.A.L.K.E.R link!





When it comes to large-scale shooters, the Battlefield games don't face much competition. There have been a few crappy clones and a couple of entertaining Star Wars-flavoured titles, but that's about it. Hardly anything that'd make EA and DICE throw their arms up in despair. But this game here might be different. It could be – and we know so many games have been hyped up like this – the Battlefield killer we've all been waiting for.

PETROL OF VIOLENT TURMOIL

Frontlines: Fuel of War will be set in 2024. So while there'll be some nifty next-gen gadgets at your disposal, it's hardly the distant future stuff on Battlefield 2142. Some may groan at Kaos' choice to stick to what is essentially a modern setting, but it's worth keeping in mind that this is what it is good at. After all, the core team came over from Trauma Studios, best known for its work on Desert Combat and Battlefield 2.

BLOOD FOR OIL

Christopher Taylor and Logan Booker chat to Kaos Studio's David Votypka and Joe Halper about their new Unreal Engine 3-powered online shooter, Frontlines: Fuel of War.





Don't think for a moment that it is just trying to jazz up its previous works with prettier graphics and some of tomorrow's coolest military tech, though, because as design director David Votykka explains, it's really trying to do something special – particularly when it comes to single player.

GOING SOLO

'We knew that with Frontlines we wanted to do a singleplayer campaign that was story-driven and very cinematic, yet shared a lot of the non-linear, emergent gameplay that occurs in the type of multiplayer games we've worked on in the past,' Votykka says. 'One of the first things we did was put a lot of effort into coming up with and polishing a very strong story and setting. Everything we did in the singleplayer campaign was based within the picture that the storyline paints.'

As the 'Fuel of War' subtitle suggests, the story is about oil. Or rather, what happens when we realise that the goopy black stuff is running out a lot faster than we initially thought. There are heaps of theories about just this sort of energy crisis and Votykka acknowledges that they had a big influence on the setting. While there will be a story, there won't be a main character you'll take control of. Rather, you'll play as a division within the Western Coalition known as the

Stray Dogs. 'One of the main reasons we made this choice is because we were tired of playing singleplayer games that force you to redo the same events over and over again each and every time you die,' explains Votykka. 'Instead, we've adopted a "chip away" style where you are always fighting as a larger force. When you die, the battle continues on around you. You effectively come back as another soldier and continue chipping away at the enemy.'

Senior producer Joe Halper adds, 'In the singleplayer experience we wanted the player to feel like they were fighting as part of a larger force. The enemy you are up against feels more like real players and less like AI bots. A lot of development went into the AI system to support this experience.'

'AI is critically important in Frontlines and we've developed the vast majority of it ourselves – rather than just use what Unreal Engine 3 gave us,' elaborates Votykka. 'Because we built a non-linear and therefore non-scripted experience, the AI's decision-making had to be

Above: 'Is it a bird? Is it a plane? Is it about to crash?' Below: Things get pretty heated on the frontline. Below left: Hunting for some damn big birds.





Above 'Where the hell did I park the car?'
Below 'Yeah baby, check out my guns.'

advanced since we won't know what approach and tactics any given player will choose. We gained a head start by using Unreal's pathing code, but all the behavioural systems were coded in-house. Actually, the AI behaviour tree is similar to what was used in Halo and has been working well for us. In addition, we've been evaluating AI Implant [a popular AI middleware from Engenuity Technologies] for the additional functionality that it provides, such as navmesh pathing, as well as pathing through dynamically destroyed objects that didn't exist when the player first entered the level.

'I loosely refer to our AI system as adaptive AI because it needs to constantly be evaluating the state of the battle and adapting the player's strategic choices,' adds Votynka. 'There is no guarantee of what the player will or will not do in this non-linear game [or] how the AI will be flanked or attacked. Therefore it must be able to wisely evaluate the layout of the area it is fighting in and how best to use it. In addition, the combat nearly always [involves] two large forces going at it,

not only with hand weapons but land and air vehicles as well. The AI can use most of the vehicles in the game, including tanks and helicopters. The player has a whole military arsenal of weapons to use against the enemy, and the enemy has a massive arsenal to attack the player with as well.'

'We are aiming for 10+ hours of gameplay in the singleplayer campaign,' says Halper, 'and because it's non-linear with multiple objectives to complete on each map, there are many things compelling the player to play through many times over. The order in which you take objectives helps greatly with how you achieve the next. For example, there could be an objective that you might want to sneak up on and [destroy with explosives]. On the way you could find a vehicle that you decide to commandeer and go ahead blazing like a mechanised Rambo. The order in which you take the objectives, the loadouts and roles you select, the routes and vehicles/weapons you use... it's all up to you.'

OVER THE TOP, LADS

One of the main problems with the Battlefield games is that they lack focus. Strategic points are scattered across the map meaning players tend to be spread out all over the place. Even on a heavily populated server – and admittedly we're talking public ones here – Battlefield becomes less about battles and more about strings of short, little skirmishes. Kaos is aware that this could be an issue in its game too so it has come up with the 'frontlines' system. 'The frontline mechanic is used in both singleplayer and multiplayer; and it does some very important things for the game,' says Votynka. 'First, in multiplayer, one of its biggest advantages is that it keeps the battle centric and focused. Instead of having players spread out across the entire battlefield, each team needs to fight on the frontline – a line shared by both teams – to capture several strategic points on it. Neither team can advance the front until they own that set of points. The beauty of it is that it inherently creates teamwork because you must both attack and defend in order to successfully advance the front all the way to the enemy base to win the map. In singleplayer it allows us to create non-linear gameplay in a large mission,





by allowing the player to do bite-sized pieces of the mission. We call these pieces "combat sandboxes". Each sandbox is made up of several objectives that can be taken in any order, and with varying combinations of weaponry and tactics. The result is emergent, non-linear singleplayer gameplay, without overwhelming the player or not giving enough direction.'

A SENSE OF CLASS

All of the gameplay was designed around player choice and freedom,' says Halper. 'We want the player to go anywhere on the map, use any vehicle they see and combine [different weapons and tactics to make for new gameplay experiences]. In Frontlines we successfully achieved a balance of RPG and RTS elements. There are six different loadouts that players can combine with four different role specialisations. These roles also have three levels of upgrades each. This not only results in a great number of strategic combinations that players can choose from, but also lets players choose

which upgrade path of specialisations they wish to pursue – a few quick choices upon spawning.' Interestingly, Kaos has decided against having a persistent scoring system à la Battlefield 2 and Battlefield 2142. While some may be a bit upset at the prospect of having to start afresh, we really like the idea. It sounds, in a way – what, with the different loadouts, three tier upgrade system and all



Top Is it gutless to be a sniper or just really sneaky and cool?
Above Who said petrol and fire don't mix.
Below 'Um... my guns are bigger than yours.'





Above 'Either there's fuel in there or it's one hell of a waterslide.'

Below There's always time for some disco-dancing.
Below right 'Mustn't forget to take the safety catch off.'

— remarkably similar Wolfenstein: Enemy Territory. Something else we're really excited about is the inclusion of remote control drones. 'The drones are just damn cool,' says Votyepka. 'All [of them] are based on real world military prototypes. We've added a bit of our "Kaos theory" to advance the designs 20 years in the future. From flying reconnaissance drones to tracked bots with machine guns and mortars on them, you just feel really sneaky and high-tech when using them. They all have offensive capabilities.'

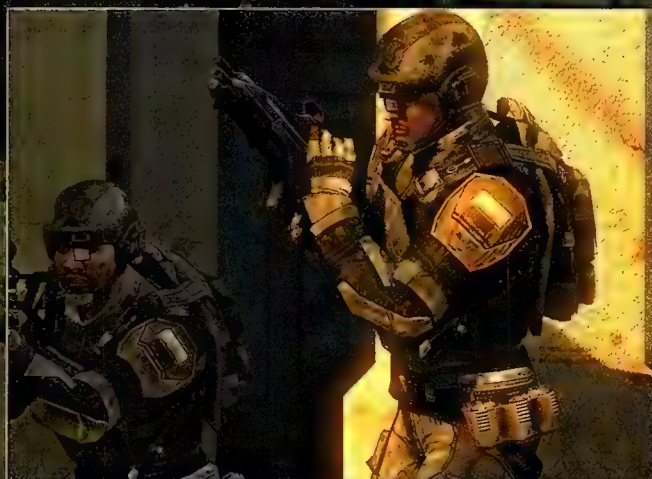
AIN'T THAT JUST PRETTYFUL

Votyepka says that having the great graphics you see in the screenshots has been one of Kaos' key goals. 'Gameplay is king, but for me personally visuals enhance or detract from my sense of immersion,' he explains. 'I love playing Tetris as much as the next guy, but that is a game that is nearly independent of having to worry about the visuals. However, with Frontlines not only are we making a fun FPS, but also a cinematic, interactive experience. I want to believe that I am truly in that world, experiencing the setting and events.'

The more realistic the visuals are, the more deeply I am immersed in that fantasy. And a greater sense of immersion can greatly amplify the amount of enjoyment that one gains from the gameplay.'

Kaos hopes Frontlines will be equally stunning on PC, PS3 and Xbox 360, but admits that all three platforms suffer from limitations. 'Most PCs these days have a gig or more of RAM, but the consoles have half that. Therefore making our levels very detailed and complex, not to mention very large, is easier on PC. On the flipside, the consoles have some great dedicated 3D graphics, as well as multiple cores that we can rely on using. Because of this, keeping a high frame rate on the consoles is usually less of a challenge than on the PC. In addition, the hardware in consoles is a known quantity we can tweak to, while we need to support many different PCs, all with varying horsepower.' He adds that Kaos is considering adding one unique element to each of the three versions that takes advantage of what that particular platform has to offer. In the case of the PC, it is looking into upping the amount of players. With the 360, it will be having Achievements for both singleplayer and multiplayer, whereas with the PS3 it's experimenting with SIXAXIS for vehicle control.

Whatever system you game on, though, it's hard to deny that Frontlines has some serious potential. Here's hoping that the finished product lives up to it. (E)



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Not a stalker in the mould of Bridget Fonda in *Single White Female*. More the 'Scavenger, Trespasser, Adventurer, Loner, Killer, Explorer and Robber' type of stalker.

S.T.A.L.K.E.R: Shadows of Chernobyl

Logan Booker stalks his comrades. Oh, and kills them.

After spending the better part of a month with GSC Gameworld's S.T.A.L.K.E.R., saying something bad about it, or even attempting to process a negative thought of the experience is about as possible as fishing for barramundi in your bath tub. So what if it's taken five years to germinate or that the original engine was built on almost decade-old technology? Neither matters in the slightest, from the second you load the game to its final, chilling moments.

For most, these moments will include being shot down by aggressive militants, imploded by radioactive anomalies, starving to death, copping enough rems to down a pack of elephants or being eaten by mutated dogs. Whichever way you choose to meet your demise, it is always fun-coated fun with fun filling.

Shadows of Chernobyl is the pinnacle of free-form gameplay. If you enjoyed running about the countryside in Bethesda's *Oblivion*, allowing only the hand of fate to guide your gaming experience, you will fall in sweaty love with SoC.

The year is 2012, some six years after a second catastrophe occurred at the Chernobyl nuclear facility. The exclusion zone around the plant has been transformed from a barren land of ghost towns and radiation into a treasure-trove of powerful 'artefacts'. Granting their users formidable abilities such as increased health and resistance to damage, the artefacts fetch an excellent price on the black market – something the government is not terribly fond of. As a

'stalker', your job is to locate these artefacts, complete missions for the zone's occupants and generally try to survive, along with 600 or so living, breathing and thinking others.

Stealing a concept from Bioware's *Planescape*, the game's protagonist is known only by the mysterious moniker of 'The Marked One'. The start of the game has The Marked One rescued from a vehicle accident by a

fellow stalker and brought to a character called 'The Trader'. From here you're left to your own devices, with nothing but amnesia, a knife, the acronym 'S.T.A.L.K.E.R.' branded on your arm and a single main plot quest in your PDA.

From your PDA the game reveals its many layers. There's a map that shows you the entire Zone – major areas and quest locations marked for easy reference; a diary that catalogues NPC conversations; a rankings page that compares your performance to that of other stalkers and a quest log that lets you mark individual tasks to provide a directional arrow on the minimap. The Zone map isn't as intuitive as it could be, the zoom function a little erratic, but otherwise the PDA provides you with the information you need.

Along with the main quests, the game automatically generates sub-quests using GSC's 'A-life' artificial intelligence system. Completing these quests improves your reputation with the stalker that assigned it and your stalker ranking,



Living in 'the Zone' near Chernobyl, it is recommended that you keep your radiation suit on at all times.

TWEAKY, TWEAKY, TWEAKY TWEAKS

Shadows of Chernobyl comes with two renderers – one based on DirectX 8 and another on D3D9. While the D3D8 engine will run smooth on most PCs, the D3D9 one is very demanding – dual-core CPU and 8800GTX recommended). If you choose to go the latter route, here are a few tweaks to get it running acceptably. Just hit the tilde key to bring down the console and type the following:

r2_gi_photons 64 Default is 16, max is 256. Reduces the 'glow' effect on objects like artefacts. Any higher than about 128 and you may as well turn off GI with r2_gi off.

r2_gi_refl 0.001 Default is 0.9, max is 0.99. Reduces reflections on lights, speed boost most noticeable when using the flashlight.

r2_sun_details off Turns off sun shadows on objects like grass.

r2_sun off Turns off the sun. Gives back a lot of performance.

r2_ls_bloom_fast off Turns off bloom. We didn't notice any performance difference, but worth a try.

r2_tonemap off Turns off HDR. Things won't seem as 'over bright' and you might see a small performance boost.

r2em 0 (requires vid_restart to take affect) Default is 2.2, max is 4. We have no idea what this does, but changing it to 0 gave about 10 frames with no noticeable loss in visual quality.

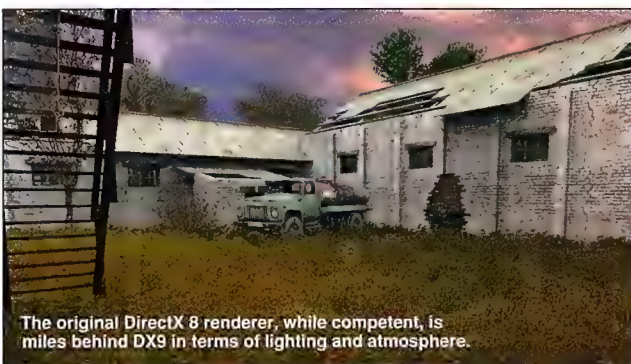
r_detail_density Min 0.2, max 0.6. Reduces/increases the density of grass. Provides a tiny performance boost when set to 0.2.

r_geometry_lod Min is 0.1, max is 1.2. On its lowest setting provides a massive performance boost, but everything will look awful. We have it at 1, but you can get to about 0.6 before the level of detail jumps become really noticeable.

Once you've done all these, type **vid_restart** to reload the video subsystem. If all else fails, just use the in-game video menu to change to static lighting. You lose a lot of the atmosphere, but the game won't skip a beat.



S.T.A.L.K.E.R.'s DirectX 9 renderer is impressive – if your PC can run it.



The original DirectX 8 renderer, while competent, is miles behind DX9 in terms of lighting and atmosphere.

and grants rewards in the form of weapons, medicinal supplies, money and food.

The A-life system also controls much of what occurs in the Zone, outside of the main plot. A-life craps mighty turds from even mightier heights on Bethesda's paltry Radiant AI. Where Radiant gives you an 'interpretation' of a living world, A-life is one. Every stalker in the game goes about their business, forming alliances, fighting, scavenging supplies and dying unremarkable deaths if logic so dictates. While playing, we

found stalkers who had handed the keys to their life sedans to everything from wild dogs to implosive anomalies.

At its heart, SoC is a FPS first and RPG second. There are no stats to increase or skills to train, just more powerful weapons, armour and artefacts. Artefacts contribute most to the character, granting a bonus while taking something away. For instance, one artefact called 'Soul' grants 600 percent more health regen, at the cost of less damage resistance. It

is up to you to find a balance.

It has been five painful years of S.T.A.L.K.E.R.-less existence, but we're overjoyed to say it's been worth the wait. The detail made possible by those months of development is reflected in every facet of gameplay. Where other games only show their shine weeks of play, S.T.A.L.K.E.R. is a glorious, bright gemstone from start to end, and start again.



Developer **GSC Gameworld**
Publisher **THQ**
Website **www.stalker-game.com**

Recommended
**Dual-core 2.4GHz CPU; 2GB RAM;
256MB DirectX 9 video.**

VERDICT

Immersive world; artefacts;
exemplary AI; 30-100 hours
of gameplay; new every time.



DX9 renderer could improve;
everyone speaks Russian;
lack of extra RPG elements.



SCORE
9.0
OUT OF 10



Yeah, there'll be a fair bit of
shooting going on... not sure what
he's shooting at here though...

Wanted: Enforcer for the Devil. Must have questionable morality and a good working knowledge of fire.



– due to his unorthodox methods. Now he has to fend for himself on Earth. However, he gets approached by the 'Abyss', the hellish equivalent of Etherlight and is offered a job. Abyss is losing the battle and needs Ryan to even the odds. He accepts.

Working for the Devil has its perks. Ryan can charge his bullets so they deal additional damage and can perform short-ranged teleportation to virtually any destination he can see. He also has 'Infernal vision', which can be used to find powerups and see things written in the Infernal vision-equivalent of a UV pen. Finally, he can teleport human-sized objects with the same restrictions of his own teleporting abilities. Using his devilish powers comes at the cost of mana, which can be restored by killing and lingering in 'Infernal' locations – for example dark caves and shadowy corridors. This energy is also drained from 'Holy' locations like churches and such.

The twist to combat is being able to teleport around, surprising soldiers by suddenly

Infernal

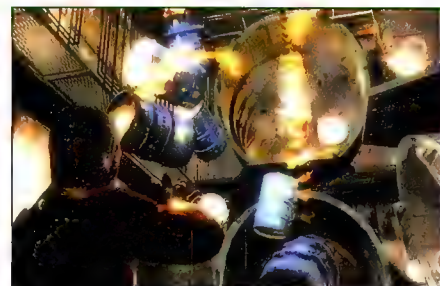
Chris Booker goes to hell in a hand basket... with a gun.

Heaven and hell. Right and wrong. Good and evil. There have been some great stories made about these concepts and the grey areas in between. Most games do not allow the hero to adopt the philosophy of the end justifying the means. Traditionally, especially in the action/adventure genre, one is charged with simply blowing away the bad guys, your morality

limited to this constant display of visceral justice. It is with this established game mechanic that Infernal attempts to fiddle with.

You play the role of Ryan Lennox, a man once employed by a company called 'Etherlight'. Etherlight is a militant organisation that enacts heaven's will on Earth. Lennox was recently dismissed – despite his number one ranking





appearing behind them and their cover. Later on, you are able to teleport multiple times in quick succession, adding further confusion for your enemy. If you're feeling particularly evil, you can teleport enemies to deadly heights and let them fall to their doom.

Infernal starts with what looks like it will be a great plot, but sadly it takes little time for it to unravel. Ryan is chatting with a female friend of his who works for Etherlight and they're discussing what could of been, what happened and what is. Just as she is about to tell Ryan something very important, Etherlight troops burst in and attempt to capture Ryan. Fortunately he manages a narrow escape and it is at this time Abyss approaches him with the offer of employment.

After this point, the story disappears, and it becomes a repetitive third-person shooter with some neat powers and the occasional puzzle. Your friend from the intro pays you a

visit intermittently and keeps saying she has something to tell you, but for some reason she keeps running off before actually telling you what it is. There is also the odd battle of wits between Ryan and enemy bosses, but they walk a fine line between entertaining and frustrating.

On the graphics side, the game looks quite nice and runs smoothly. The environment isn't very interactive though, save for a few explosive barrels, so it isn't as impressive as first glances would indicate.

Infernal starts with great potential. The plot is interesting, the combat is fun and you get introduced to new powers bit by bit to keep it fresh. But ultimately Infernal feels like you've watched the first three episodes of *Lost*, gotten drawn in, then suddenly all the plot hooks vanish as they combat wave after wave of the Others, and you ask yourself if you can really drag yourself through the boring bits just to find out how it finishes. 



'He's behind you!' Teleporting allows Ryan to introduce a pantomime element to killing. Nothing like messing with your victim before the fatal blow.

PC

Developer **Playlogic**
 Publisher **Atari**
 Website **www.atari.com.au**

Recommended
 2GHz CPU; 1GB RAM; 128MB
 DirectX 9 video card

VERDICT

Infernal powers;
 looks and runs smoothly;
 seems interesting...



...at the start; becomes
 repetitive; boss banter
 becomes frustrating.



SCORE
6.5
 OUT OF 10



Bohemia Interactive's return to mainstream gaming is *Armed Assault*, which is *Operation Flashpoint 2* in all but name – that's a nice way of saying that former publisher Codemasters has retained the rights to *OFP*.

All the hallmarks of the original are intact, from the believable campaign through to the stonkingly bad voice acting. The fictional island of Sahrani is the focus of the current flashpoint where, as a soldier in the US Army, you're faced with an uprising from the Sahrani Liberation Army (SLA). The main campaign kicks off with a chaotic retreat from the overwhelming SLA forces from the North, where you'll be spending the first few missions performing raids and sabotage missions to halt their progress.

The missions are tied together with long-winded cutscenes, often involving a nice long drive across the island. You'll have to put up with high-school dialog and drama school voice acting, but it does help reinforce that the island is one coherent, living mass of terrain.

Even though the 400km² island is big, it doesn't feel like any half measures were taken in its design. Every town, hill and road looks like it's meant to be there, and no matter where you go

ArmA: Armed Assault

David Kidd thought it would be cool to flash his point at enemy soldiers.

The boys at Bohemia Interactive pulled off an amazing feat with *Operation Flashpoint* (*OFP*), yet it was built from such a simple formula. You see, when you installed *OFP*, you were really looking at a fully stocked kitchen – stay with us – where the pantry was filled to the brim with condiments, the fridge was packed with meat, and you had every utensil necessary to whip up any dish. By mixing these ingredients together, *OFP* became the most flexible first-person modern warfare simulator ever.

The mix of mission types, vehicles and campaigns had you playing a number of roles. You could be a Special Forces operative stealing documents in a stealthy night-time raid, or you could find yourself piloting an Apache AH-64 in an escort mission alongside a rumbling convoy of supply trucks. The binding element was an adherence to realism, and the end result not only attracted gamers and modders, but also drew the attention of militaries around the world –

a version of *OFP* called *VBS1* has been licensed to the US Marine Corps, and the Australian and New Zealand defence forces.

Looks like a job for Roger Explosion.



Throwing infantry at a machine gun nest until it runs out of bullets is not an effective strategy, despite what the English may tell you.



you'll feel like every battle is on a crafted stage rather than a random mission generator.

Unfortunately, some of the missions shoot down any sense of realism that the island itself imparts. One mission, for example, has you running a solo sabotage job on a couple of enemy tanks in a night time raid. The camp is crawling with troops, and the first tank to explode is going to draw fire no matter how well concealed you are. But just to prove your superiors have a sense of humour, you're given an unsilenced weapon to prevent you picking off troops from the top of that conveniently placed hill. Quite why BI thought this was either realistic or fun is a mystery, but the absurdity evidently became apparent – the latest patch introduced a silencer to the mission.

The other area where Arma comes unstuck is the squad control interface. We haven't seen it done particularly well in any game, but in the tense, chaotic missions of Arma, a couple of stray bullets can ruin your squad and end the mission. The last thing you need is to be scrolling through menus to snap your team into action, particularly if you have the nightmare of mounting your squad in and out of vehicles.

The interface and patchy mission structure can understandably put you off playing more complex missions, but Arma offers so much variety and customisation that you'll find a hundred other things to keep you interested. The mission editor gives you full control over custom scenarios, providing you with the tools to create big or small missions quickly and comprehensively. You could, for instance, create a complex, sweeping battle over the island, or you could build a tight, tense scenario by simply dropping a squad inside a church on a hill, and have them fend off an assault.

Overall, there's a sense that Arma is still unfinished – as reinforced by the latest whopping 460MB patch. But the sheer scale and ambition has resulted in one of the most thorough tactical combat games since Operation Flashpoint. The inevitable improvements from BI, combined with OFP's existing fanatic modding base, will undoubtedly create the ultimate warfare engine. This makes it more of an investment for the future, but while you wait for that moment of rapture, there's still enough here to keep you going for months. Stick with it – big things are coming.



PC

Developer Bohemia Interactive
Publisher Red Ant
Website www.armedassault.com

Recommended
2GHz CPU; 1GB RAM; DirectX 9
graphics; 3GB HDD.

VERDICT

Satisfying world and mission structure, really real realism, modding potential.



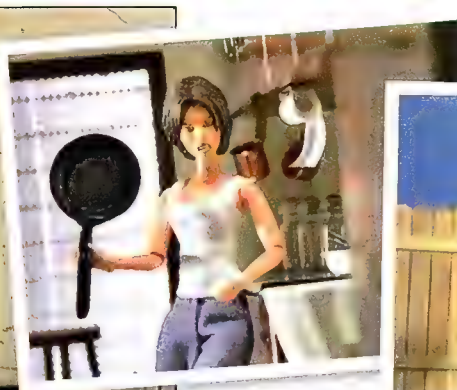
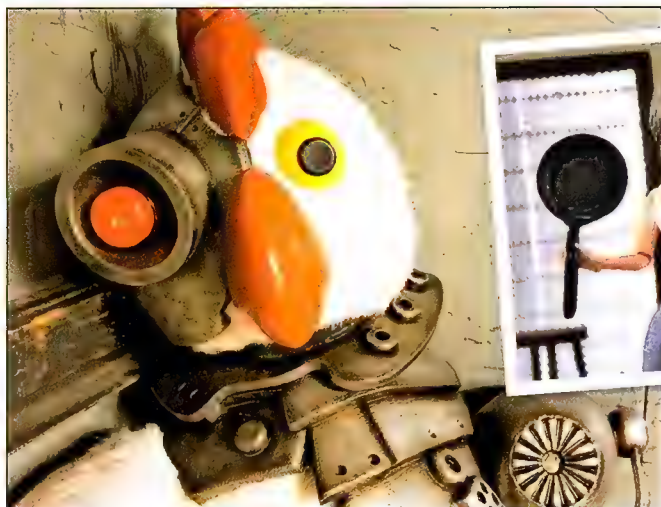
Squad control UI, crappy vehicle control, varying mission quality.



SCORE

8.0
OUT OF 10





Robot Chicken

DVD

Madman | www.atomicmpc.com/shows/robotchicken

Seth Green and Matt Senreich's Robot Chicken doesn't taste like chicken to the comedy connoisseur at all – more like sweet and sour pork. You know, the Kan Tong plum one. If this happens to match the flavour of your funny bone, then *RC* will tickle it harder than an older brother trying to force his younger sibling to soak their underclothes.

The show relies on short sketches using a combination of action figures and clay, brought to life with stop-motion photography. The figures range from superheroes to movie stars, through to senators and presidents, and *RC* doesn't hold back when parodying its subjects. For example, the first skit of the show, 'Real life Metropolis', has Batman, Wonder Woman, Aquaman and assorted others living under the same roof. An alcoholic Batman, and Aquaman's attempts to come to terms with his utter uselessness, provide many of the laughs here.

Like any sketch comedy show, some of the pieces miss their mark, especially the US-oriented ones, but for the most part *RC* is great viewing. **LB**



Atomic interviews Robot Chicken creators Seth Green and Matt Senreich!

atomic Where did the idea for *Robot Chicken* come from?

Seth Green Originally it was an idea for the *Conan O'Brien Show* to make a short film in lieu of an interview. I approached Matt [Senreich] because we had mutual experience and interest in pop culture, toys, '80's cartoons and other general silliness.

Matt Senreich From there it just kind of spiralled into Sony Digital calling us up wanting to do 12 animated shorts for their website in 2001. We, in essence, used those 12 episodes to shop around as a pilot and Adult Swim picked it up in 2004.

atomic How about the idea to use stop-motion animation, action figures, etc? Was this the plan from the beginning and how has it evolved as the show progressed?

Seth Green: It was always the intent to use stop-motion animation, action figures, that type of thing. We're all big fans of the medium of stop-motion and the idea of making specific parody commentary on these properties and brands works best by using the toys themselves.

atomic Did you ever write or plan out an episode of *Robot Chicken* so offensive that you were unable to air it? If not, have you ever had an idea for an episode that you knew pretty quickly would be going overboard?

Seth Green Episodes aren't really written from start to finish as episodes. They are written as collected material and then we organise them as to what will make the best episode. We write sketches, we write jokes and then we try to fit them all together to make the best sequential episode. But yes, we've had some incredibly offensive gags that we all vetoed just because we thought they went too far.

Matt Senreich There was one in particular about a stillborn baby that we just thought was way too over the top, and disturbed even us.

Seth Green We've made some bad jokes but the stillborn baby episode never made it in.

atomic Seth, many of your TV and movie roles have had you playing stereotypically geeky characters: the computer hacker; the musician; and the son of an evil genius. How closely do these roles reflect your own interests and how do you feel you have shaped the perception of these stereotypes in popular culture?

Seth Green I think people's opinions of stereotypes in general have changed with the success of a movie like *Napoleon Dynamite*. It became kind of cool to be a super nerd. So there's not as much of a stigma attached to any particular personality trait. In the modern world there's room for everyone. I don't know if I've had a hand in shaping people's opinions of it but it's certainly nice to be tolerated.

Win a copy of Robot Chicken: Volume 1

Seth Green and Matt Senreich's stop-motion creation is very funny. So funny you'll laugh your head off, and more than likely other parts of your body as well. If you'd like to grab the first volume of the show on DVD, you're in luck! Thanks to Madman, we have five copies to give away.

For more details on how to be in the draw, visit www.atomicmpc.com.au/competitions





The Road to Guantanamo

DVD

Distributor: Madman Director: Michael Winterbottom
Starring: Rizwan Ahmed, Farnad Harun

The Road to Guantanamo is a hard film to fully comprehend, let alone write about clearly and concisely. It's challenging viewing. Only problem is, we're not sure that it's challenging in the way it's supposed to be.

It's about three young men and their journey from their home in the UK to Pakistan, Afghanistan and, eventually, the infamous Camp Delta at Guantanamo Bay, Cuba. It takes the form of a docu-drama. In other words, most of what you see is a re-enactment based on the accounts of the trio, who were released without charge in 2004. While the whole 'docu-drama' technique is interesting, it's more trouble than it's worth. *Road* has the nasty habit of failing to distinguish between actual footage and the aforementioned re-enactments. The narrative is rather fractured, particularly during the Afghanistan segment. While the film covers a long period of time – and understandably can't dwell for too long on a particular point – it seems a bit... rushed. It fails to explain things that really could do with some justification or rationalisation, such as the trio's taste in travelling companions. That said, the clarity, not to mention quality, of the film definitely picks up once the trio gets to Camp Delta.

Despite our grievances, *Road* isn't terrible. But while it should be admired for being so ballsy about a very touchy issue, it is still deeply flawed. **CT**

score **5.0**
OUT OF 10

Oz: Complete First Season

DVD

Distributor: Paramount Director: Various
Starring: Harold Perrineau, Edmund Walker

'Oz – that's the name on the street for the Oswald Maximum Security Penitentiary. Oz is retro. Oz is retribution. You want to punish a man, separate him from his family, separate him from himself, cage him up with his own kind.' So begins one of the most memorable shows in recent years – or, depending on your perspective, maybe the most homoerotic soapie in the history of ever. While *Oz* isn't as good as some of HBO's more recent offerings, it's still essential viewing. If you haven't seen it yet, it's definitely worth a blind buy. Be warned though, as it can be pretty brutal – although if you've seen *Rome*, and we're not talking about the butchered version that Channel 9 aired, it'll seem pretty tame in comparison.

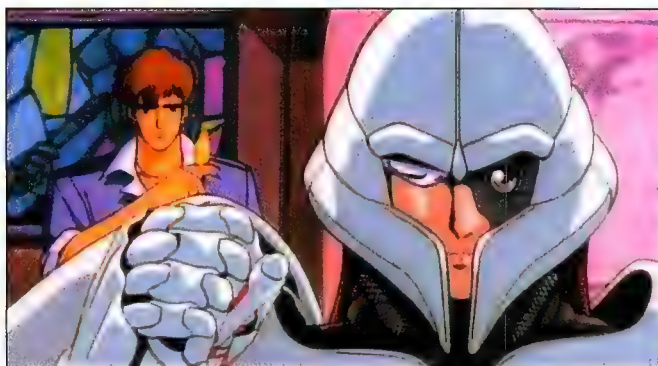
It's amusing to see the cast in action. There are some brilliant actors who've since gone on to appear in all sorts of things, including *Law & Order: SVU*, *The Wire*, *The Third Watch*, *The Sopranos* and *Lost*, not to mention movies like *Lord of War*, *28 Weeks Later* and *Spider-Man 3*.

It's just such a shame, especially considering how long overdue the region four release is, that the DVD presentation is so half-arsed. There isn't a single feature. Not even an image gallery. While the episodes are the important part – and at the end of the day what you're paying for – it would've been nice if this show was treated with the respect that it deserves. **CT**

score **8.0**
OUT OF 10

ANIME OF THE MONTH

Your regular dose of anime goodness courtesy of our resident expert Armina Soemling



Appleseed OVA

Studio Bandai Visual Distributor Madman Web www.madman.com.au Price \$24.95

On the surface, *Appleseed* seems tasty – with biodroids, a dystopian city and terrorists. But when you peel back the skin and get to the core, it's rotten. You are much better off enjoying the other fruits of Masamune Shirow, such as *Ghost in the Shell*. Terrible puns aside, *Appleseed OVA* is lacklustre, especially compared to the 2004 remake.

Set after World War Three, the General Management Control Office constructs a supposed utopia known as Olympus, run by biodroids – half-human half-cyborg beings. It delves into the heart of the 'freedom of thought versus the perfection of a homogenous society' debate.

So what makes this movie a bad apple? Unless you're acquainted with the manga or the movies, you'll have no idea what's going on. This means you don't give a flying fiddle about any of the characters. And the swearing is pretty crass. While the mecha designs are unique, the animation is sub-par. It is also hard to take the movie seriously when one of the main characters looks like a big cyber-bunny.

score **5.0**
OUT OF 10

GEEKETTE

A girl's eye
view of the
gaming worldLegs, legs,
legs...
and not a
cankle in
sight.

Bad games, bad girls

Kate Inabinet wants to know if spell casting in a miniskirt is really appropriate.

Video games have now been added to the list of things that cause girls to go hungry when there is perfectly good chocolate cake to be had.

In the past, the right to give girls an eating disorder used to rest solely in the sinewy lap of the media. Since time began, advertising campaigns have aimed to deprive girls of their self esteem in order to hawk a product that claims to 'fix' whatever flaw was impressed on them. Television, music videos, music lyrics, magazines and films all proudly display an endless series of gaunt, yet oddly buxom waifs in a tireless crusade to banish the world of the plain, dowdy and spotty, or worse – those annoying girls who dare to defy the norm and exhibit an air of confidence regardless of what they look like.

Naturally, there has been some rebellion against the skeletal influence of the likes of Posh Spice. In the world of music video clips, gangsta rap has become increasingly prolific, along with an abundance of bootilicious babes with more curves than an F1 racing track. But having slightly more flesh straining against a bikini while pretending to be a high class hooker fawning over a blinged-up pimp is not quite the positive influence one would hope for.

Finally video games are being recognised as able to hold their own in the destruction of self esteem. As more and more girls flee from the superficial world of magazines and film and search for a more fulfilling past-time than recounting the latest rehab stint of some celebrity, they discover that negative body image can rear its fat ugly head in the most unlikely of places.

It's common knowledge that female game characters are as ridiculously proportioned as Barbie, and there's no denying that I've whined about them previously. But it seems that games are picking up where that plastic freak show left off when it comes to providing something unattainable for girls to strive for in their search for self confidence and perceived physical perfection.

As a 5'4" brunette with a chest so flat it was virtually concave and yet sporting a butt you could serve tea off, it was hard not to feel insecure as my fag-hag Barbie Doll flaunted her impossible curves in an endless array of figure hugging outfits for the appraisal of the eerily pretty Ken. Now that my world revolves predominantly around MMOs, little has changed. Barbie still

reigns as prototype queen among game characters everywhere, disguised as anorexic Blood Elves in their 'leet' G-string armour or pneumatic elementalists in little more than a mini skirt and fetching thigh high boots.

At one stage, it was hard for a game not to cause me to seriously question if indeed I was attractive to the opposite sex, when you could stand me next to the average female character and our opposing proportions could fit perfectly together like pieces of a human jigsaw puzzle.

Luckily, with age comes wisdom and an ability to accept one's alleged physical shortcomings with grace, humility, and a pair of killer heels. I no longer feel I have to compete with Barbie, nor with game characters, as I've come to understand that like myself, the poor dears are merely the product of their creator, and deserve my compassion rather than scorn or jealousy. I'm not perfect. But nor is my elementalist, with her monstrous rack that must ache terribly when she runs without the proper support that appropriate armour could provide.

Ad campaigns are slowly getting the message that the hyper-sexualised images of women these days are simply not getting the results they used to, as girls are growing more disillusioned with the importance placed on looks, weight or the perfect party frock over intelligence or talent.

It'll be a while before the games industry catches up to the fact that girls are being represented as lesser individuals because of their sexuality, and take time out from working on an increasingly complex rig to achieve the perfect chest 'bounce' in order to create a more attainable image of a female character. While I wait for an avatar to be created who is short, plumpish and armed with fierce intelligence and a razor sharp wit as well as an awesome weapon, I'll continue in my search for some armour that might cover the shame of my poor elementalist.

Join Kate's campaign to frag all the hotties. Just send her an email to join up.

geekette@atomicmpc.com.au



“Her monstrous rack must ache terribly when she runs without the proper support.”



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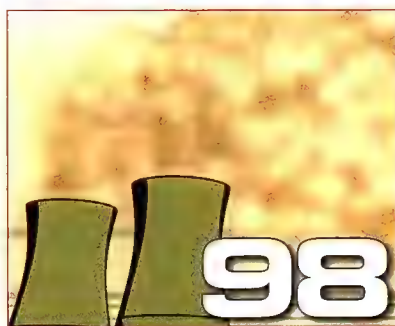
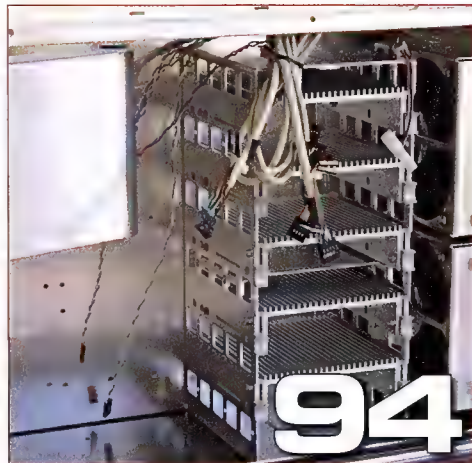
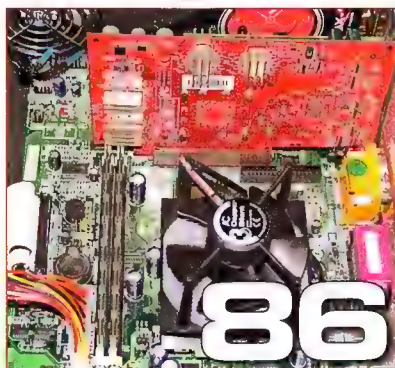
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TECHNIQUE

HANDS-ON TUTORIALS FOR THE TECHNICALLY INCLINED

Why buy a laptop when you can make your own mobile computer out of a \$26 briefcase and old bits from around the house? Seriously. If you're wondering how such an awesome feat can be accomplished, read part 2 of Ron Prouse's tutorial this month, beginning on page 86.

For the SupCom fans, we have a user interface modding tute that should get you started in this complex world of coding, and Chris Taylor was nice enough to impart some of his choice gameplay tips, all of which you can find from page 90 onwards.



TECHNIQUE CONTENTS

PC in a suitcase part 2 86

The finale to Ron Prouse's mobile PC project, whereby eager readers get the lowdown on creating the ultimate in PC portability. You'll never look at a suitcase the same way again.

Supreme Commander UI modding 90

Logan Booker couldn't help but add his own touches to Gas Powered Games' RTS Supreme Commander. Designer Chris Taylor helps out too!

Input Output 94

It's the Dan Rutter classifieds – now with added class!

Hotbox 96

Submit your case now for the chance to win, or, if you just like looking, discover who won this month!

Fallout 98

Logan Booker has evidently been playing far too much S.T.A.L.K.E.R.

Have an idea for an Atomic tutorial?

Then send an email to lbooker@atomicmpc.com.au!

When it comes to tutorials, Atomic likes to tackle the hard stuff. If it's not hard enough, we just don't do it. Alright – that's not necessarily true, because every once in a while, we like to cover the easy tutorials too. Not so much easy as basic, you know... building the skills, the foundations you need so you can have a go at those tricky tutorials.

We know that techniques change, as does technology, and guides that might have been useful a few years ago can be close to useless today. So, if you have an idea for a basic tutorial, like soldering, water-cooling or harpooning whales even, let us know.

Now go email!





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Build your own PC in a suitcase, Part 2

Ron Prouse continues his quest to turn a briefcase into a PC.

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- 1x TP-Link 8-port Fast Ethernet Switch TL-SF1008D, \$29.95
- 1x Noise Isolator Flex Pad Kit, \$25.00
- 1x Arctic Cooling AF8025 Fan, \$8.50

At the end of Part 1 we had installed the hard disk, CD drive and power supply into our pseudo-aluminium briefcase, and carved up a suitable backplane that we could graft into the side of the enclosure. As we mentioned, the concept of a 'stealth' application was rejected for the ability to have a fully functional case that could be used without having to lift the lid all the time. The backplane section has been cut so that there is a 10mm lip around the outer edge where it connects to the briefcase,



giving us plenty of room to attach the two sections mechanically. The first step was to cover the side of the enclosure with masking tape to protect the surface, measure the opening required and then cut it out with a jigsaw. At this point the briefcase became extremely fragile, as there was very little holding the sides and base together. It also became obvious that we would have to remove the lid, as the leverage pressure on the hinges was distorting and risking destruction of the rear body panel.

1

The backplane/motherboard tray was then fitted into place after some final shaping with the Dremel to get the exact profile required. The outer edges were then chamfered and the corners smoothed off to protect soft, geeky fingers from injury.

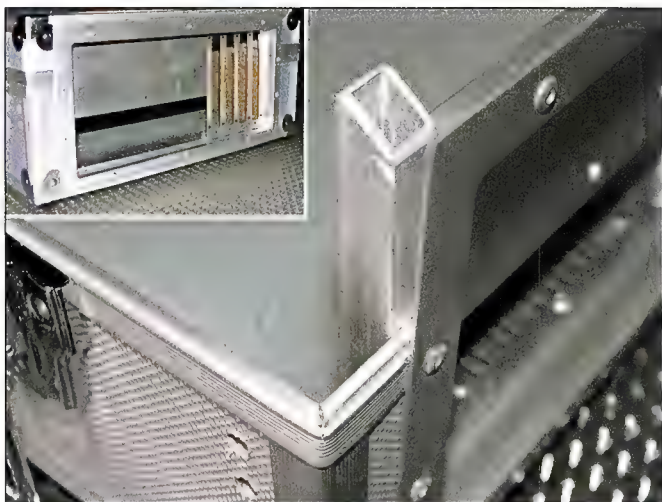
The main area to keep an eye on here is the squareness of the case – that all of the corners are maintained at 90°, especially as the case does not have much in the way of structural rigidity at this point. A method that we found useful was to scribe a series of square guidelines around the outer edge of the opening, like a grid, and then use those lines as guides when fitting components into place (see the right hand side of the picture, below left).

Before final fitting, the backplane was given an undercoat of aluminium coloured paint – Septone gloss engine enamel – to help blend it in with its surroundings. Once fitted, the plan is to give it a final coat of the same product, to cover-up any blemishes that occur during bolt-up. Although not shown in this picture, at this point the lid of the briefcase was also cut out, to form the other half of the opening.



2 The backplane is now ready to be fitted into place and as such it becomes a major structural member. As mentioned in Part 1, the briefcase is constructed as a thin aluminium skeleton around the outer edges, with an MDF wooden skin forming the top and sides. The idea is to securely attach the backplane to the framework with 1/8" aluminium rivets, adding strength and torsional rigidity to the whole case. This is not as simple as it sounds, as even the aluminium framework is fairly flimsy when compared to the sheet steel backplane – the answer was to engineer a sandwich construction that will tie all of the components together into a solid unit. Using sections of 12mm square aluminium bar for the rear support, 1/8" holes are drilled through the lip of the backplane, aluminium framework, wooden skin and the support, and then compressed together with three pop-rivets down each side. The lower edge of the backplane is simply riveted to the existing framework.

The 12mm square bar was fabricated to serve two roles. Firstly, it is a strengthening component, but it's also used to support and position the lid correctly. With the top chamfered on an angle, the support will 'grab and centre' the lid as it is closed, and the edge of the lid opening is then guided into a U-shaped lip that holds the side of the lid firmly against the inner edge of the backplane (*picture inset below*).

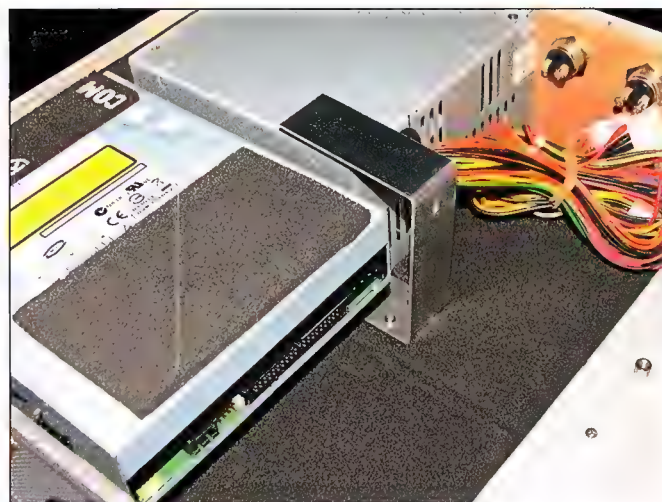


3 The next step was a purely aesthetic one, but one that will help to make the final outcome look much more professional and neat – a cover for the drives and power supply. It also gave us something to do with the top section of the donor case.

Many of you would have used a Dremel cut-off wheel in your modding activities, however, one of our favourite weapons takes that concept to a supercharged, testosterone-filled new level: enter the 100mm grinder and 1mm thick metal cutting blade! We used a grinder to cut out the backplane in Part 1, prompting a few people to question just how to use this tool safely. An angle grinder and a Dremel use the same principals – they erode

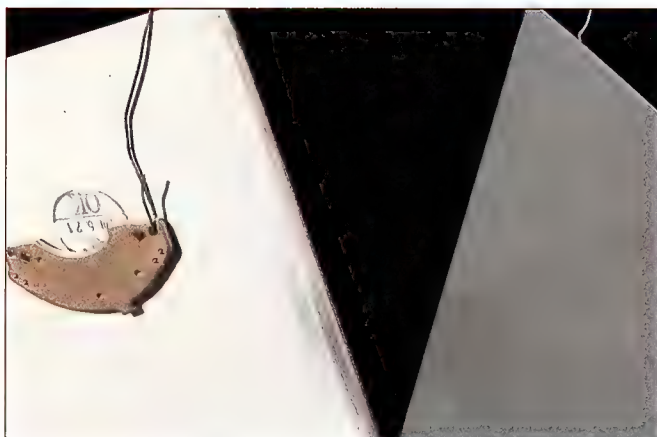
the subject material with an abrasive wheel being spun at high speed. However, the angle grinder can remove much more and more quickly! Both tools discharge very hot particles tangentially, and both leave their cutting edges dangerously exposed. When using an angle grinder, personal safety *must* include safety goggles, while gloves and ear protection are also desirable. Make sure that the work piece is securely clamped down, and that the work area is free from obstructions. Hold the grinder firmly with your preferred hand, keep the cord away from the cutting wheel, and allow the grinder to spin up before placing it on the item being cut. Let the grinder proceed at its own rate – that is, don't try and force it to cut faster – and be prepared for the inevitable 'kicks and bucks' as the wheel grabs and cuts. The cut in the picture was achieved by marking a pencil guideline on the cover, then gently using the grinder to mark out a groove across the sheet metal and then finally cut completely through the cover in one slow pass. The great thing is that, used carefully, the grinder did not even discolour the paint around the cut.

4 The cover was fabricated so that it was a tight press-fit into the left-hand side of the briefcase, with the rounded section and lip left on the open edge. An aluminium bracket was bent-up out of a 25mm-wide section of 1.6mm thick flat strap, and mounted to the floor with three 25mm screws. The bracket then had a 3mm hole drilled to attach the cover securely. Before fitting the bracket, sound-deadening foam was stuck down to the floor and areas of the ROMs and PSU where the cover would otherwise make contact, in order to help dampen any internal vibration.



5 After the final fit-up, the cover was painted silver to make it look more integrated, which is worth mentioning if only for the method we used. There is no doubt that painting is easier when the item is hanging in mid-air, allowing you to get at all sides, and edges, without obstruction. It is also better for drying-off as dust, fluff and bugs are



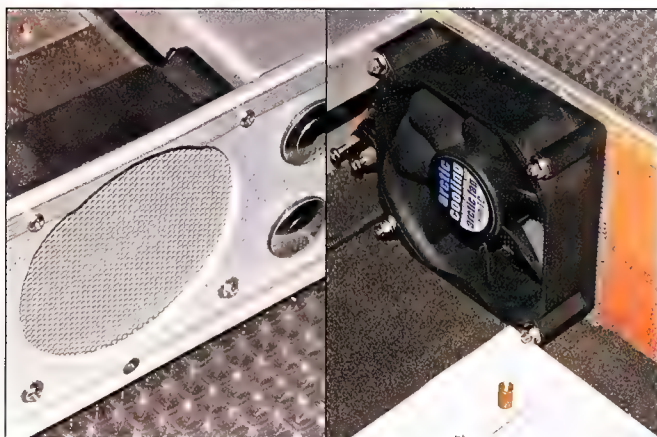


less likely to settle on the surface than if it was left lying flat. Usually, this means poking bits of wire through any available hole to hang up the items to be painted, but when that is not possible, what should you do?

The answer can be as close as an old hard drive. Hard drives contain very powerful magnets, usually attached to metal backing plates with holes in them (see lower left hand side of the above picture), that will attach like limpets to any ferrous metal surface. Split an old hard drive, prise out the magnet (no, it won't function as a hard drive ever again) and attach some tie-wire to it. Metal things will then obey your commands.

6

In Part 1 of this tutorial we opted not to include an additional exhaust fan, using the out-take fan in the PSU to perform that duty. That decision was rescinded when we found a piece of spare real estate at the rear-bottom of the briefcase that was just large enough for an 80mm fan. After relocating the reset button, a 77mm hole-saw was used to cut out the centre hole, and 3mm mounting holes drilled to suit. To add some rigidity, the fan was mounted so that the top two screws passed through the aluminium edging, with the lower screws through the bodywork. A section of AC Ryan MeshX was cut out and screw holes drilled, and then the mesh was sandwiched between the case and the near-silent Arctic Cooling Pro TC fan. An unfortunate fact of life is that, depending on the viewing angle, the blowhole does not look perfectly round due to the outer contour of the case.



7

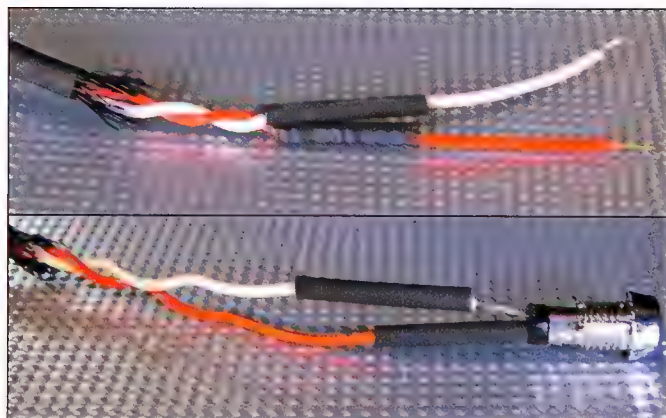
Around the labs, this PC has had the working name Project Leechbox, but regardless of your planned usage there is one thing that every PC needs more of: LAN ports. So with that in mind, we installed a TP-Link 8-port Ethernet switch, mounted into the lid of the case with the ports externally accessible through the rear of the panel. The process was simple enough: rescue the PCB from the plastic enclosure, measure up and cut out the hole for the ports in the lid panel, screw the PCB into place and modify the power supply cable.



The bare PCB is relatively safe to use, as it runs on 9V power. However it is important that it is insulated from any of the metal components, so 10mm plastic tubing was used to fabricate two stand-offs for the mounting screws, with nylon washers used to protect the PCB. As dictated by our original design concept that all of the connectivity would be externally mounted, the power cable was cut, and an RCA panel connector – Jaycar catalogue numbers PP0242 and PS0262 – used as a connector on the rear of the case. Just make sure to keep the polarity the right way around.

8

Cable sleeving is a great aesthetic addition to any case mod, and it doesn't take long to do once you get into the zone. Molex de-pinning tools are inexpensive, and once the connectors are removed the rest is simple. For a really great look, the trick is to sleeve all of the



10

The last step was to paint the exposed wood on each of the external cuts, using White Knight silver enamel.

There is no doubt that the final product is an enigma. That is, the more that we added external PC attributes – such as the backplane, ODD, and Ethernet switch – the more it looks like a briefcase, and yet its functionality is blatantly obvious.

At the outset of this project, we made the decision to create an enclosure that had all of its connectivity external to the case, so that the PC within could be used without having to lift the lid under normal use, and on that basis we have achieved the outcome we were after.

Every panel of the original briefcase has been modified in some way, and one of the gratifying side-effects of this is that we have actually made the whole structure more rigid and secure than it was before we began. The other gratifying factor about this mod is that it is both fun and practical at the same time. If only it was real aluminium! 



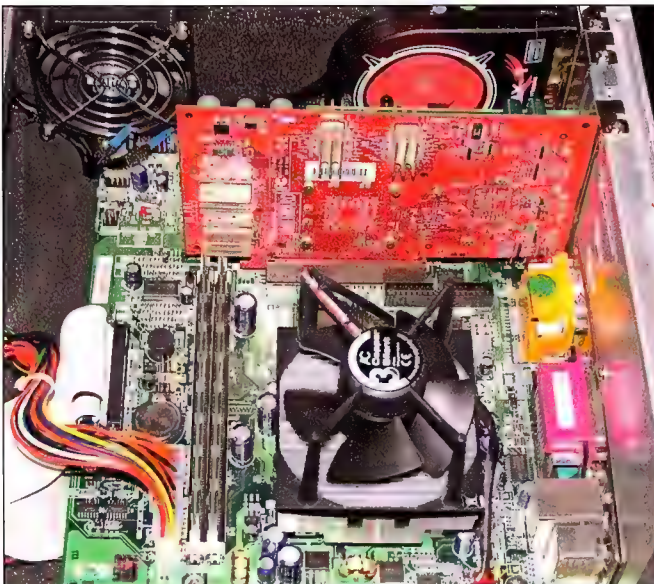
wires, including fan and LED cables. As with any wiring, make sure that the connections are electrically sound before you worry about the sleeve, and take the time to solder joints rather than just twisting wires together. For the perfect result, use the right diameter heat-shrink for each application, and don't use a cigarette lighter to contract the shrink tubing – a hairdryer will give more even results without the black scorch-marks!

In this application, with a very low-temp system installed, all of the case fans were supplied with 7V power – using the 5V PSU rail (red wire) as the negative and the 12V rail (yellow wire) as the positive gives a potential difference of 7V. This will keep the system running quietly but with more than adequate ventilation. Prior to the system being installed, the visible areas of the bottom and sides of the case were lined with acoustic foam. This stuff is a fantastic way to make any case interior look sexy, you can use it to secure – and hide – wires behind it, and it can even help to minimise noise.

9

So, what is powering our briefcase PC? Those of you expecting 'bleeding-edge' will be disappointed. As we said in Part 1, this is an enclosure that could be used with hardware from any level of the performance spectrum – in this case we are setting the bar very low!

We have used a Pentium III 800MHz processor with a super-quiet Arctic Cooling Copper Lite HSF, AOpen MX3S motherboard, 512MB PC100 RAM and Gainward Ti4200 graphics card – all of which are components that you probably have left sitting around from a couple of upgrades ago. A FireWire card adds to the connectivity, and an Evercool Fox-1 System Blower helps to move warm air from around the video card to the outside world. Audio is left to the dubious AC97 onboard after the SoundBlaster Live! Value was accidentally stepped on by an enthusiastic four-year old helper – there's a lesson to be learned there as well. Ribbon IDE interconnects were used, mainly as we couldn't find any rounded cables short enough to neatly fit between the drives and the motherboard.





DIFFICULTY HARD 

Write your own Supreme Commander UI mod

Logan Booker shows you how to add a little piece of you to Chris Taylor's RTS.

LUA CRASH COURSE

Lua is not excessively complicated. If you have any experience with an object-oriented language like Java, C++ or C#, then you should pick it up quickly. For Supreme Commander, there are a number of good resources to find out the unique functions, values, commands and tables required to get SupCom to do what you want it to:

Gas Powered Games modding forum
forums.gaspowered.com/viewforum.php?f=19

Supreme Commander Universe Wiki
wiki.supcomuniverse.com/wiki/Main_Page

Lua documentation
www.lua.org/docs.html

Other than these, the next best thing you can do is extract the mods.scd file in the Supreme Commander gamedata folder. In here are a few example mods, to give you an idea of how they're structured. Delving into the modules in the lua.scd file will also expose a lot of the game's inner functions.

More and more games are embracing the easy facilitation of community modding. Not only does it extend the life of a game, but allows the developer to see what additional features players would like to have implemented, using functional examples.

One such recent game to take this philosophy heartily on board is Supreme Commander. Using Lua, a popular scripting language, players can change unit 'blueprints', alter rule sets, and even add elements to the default user interface (UI).

Currently we're still waiting for a software development kit (SDK) from Gas Powered Games to detail all the hard-coded commands in the engine, but that doesn't stop us from working a few things out for ourselves. In this case, we're going to create a small window that gives us a continuously updated status report on kills and wasted resources.



Chris Taylor on base-building 'I'm definitely a small footprint kind of guy, I like to tech-up and build a lot more power in my base. If you start getting extractors and things like that, and spreading and doing the viral style, you'll find that it is indefensible. Your opponent will come along and rip it up after a while. The only other thing that would make sense for me is to have another completely unique base somewhere where your opponent would never look.'

The start bits

Firstly, patch Supreme Commander to the latest version. The easiest way to do this is to create a GPGNet account and log on to GPG's gaming network. It will automatically detect what patches need to be applied and download them.

Before we even start coding, we need to enable debugging. This will let us bring down the console in-game with the tilde key and find errors in our code. Navigate to C:\Documents and Settings\\Local Settings\Application Data\Gas Powered Games\SupremeCommander, where <current user> is the name of the Windows account you're logged in to, and add the following to the game.prefs file you find there:

```
debug = {
  enable_debug_facilities = true
}
```

Then, go to the 'bin' folder under the Supreme Commander directory and create a batch file called 'sc.bat'. Inside this file, write:

```
@echo off
SupremeCommander.exe /windowed 1024 768
```

When you start SupCom to test your mod, use this batch file instead. It will start the game in windowed mode at a manageable resolution, so editing your scripts is less of a headache. Also, with the debug facilities enabled, we can hit F9 in-game to bring up the Lua script log. Anything marked in light orange is an error, and the log is comprehensive enough that you should be able to track down problems quickly.

Once all this is done our next port of call is the 'gamedata' folder in the Supreme Commander directory. Under this folder, you'll see a number of files with the extension 'scd'. These are SupCom's data files and contain

the game's models, AI, maps and other information. They also happen to be zip-compressed and viewable in WinZip, WinRAR and other archiving applications.

Look for 'lua.scd' in this folder and extract it to a directory on the desktop. Now you can view and use parts of the Lua code from the game itself, the files serving as a reference point for hard-coded commands. A good idea that will help you get your head around SupCom's data structures is to snoop around these directories.

Next we need to make a place for our mod. Head back to the Supreme Commander folder and create a new directory called 'mods' if it doesn't already exist. Inside this new directory create another folder called 'scmod'.

Now that we have the necessary directory structure in place we can start our mod.



Chris Taylor on early-game strategy

'Do not get so carried away in your own base-building strategies that you forget about your opponent earlier on in the game. Flying a little recon is worth its weight in gold!'

Information station

The first file we're going to create in 'scmod' is 'mod_info.lua'. This file will store the initial data SupCom will load so that the mod can be registered in the Mods menu of the game. Open the file and enter the following code:

```
name = "ScoreTime"
version = 1
copyright = "Atomic"
description = "Shows current kills, wasted energy and mass in real-time."
author = "Atomic"
url = "www.atomicmpc.com.au"
```

```
selectable = true
ui_only = true
```

After you've entered this info, save and close the file. It's not complex stuff. That comes later.

Hooking with style

The key to getting our frame into the game is to insert code into the function that loads the game UI. This function, called 'CreateUI', is stored in 'gamemain.lua'. Fortunately for us we don't need to copy the entire file and make changes to it, we just need to hook into CreateUI and add the code we need. Create the directory structure 'hook/lua/modules/ui/game' under 'scmod' and make a new file called 'gamemain.lua' under it. Inside this file, place the following code:

```
local originalCreateUI = CreateUI

function CreateUI(isReplay)
    originalCreateUI(isReplay)
    local parent = import('/lua/modules/ui/game/borders.lua').GetMapGroup()
    import('/mods/scmod/hook/lua/modules/ui/game/scframe.lua').CreatePanel(parent)
end
```

The first line stores the current CreateUI in a variable so we can call it in our new CreateUI function – which is exactly what we do. We then attach our new frame to the 'map group' control – essentially the main game viewport – so we know where the widget will appear in-game. We do this by assigning the group control to the variable 'parent' and then using the

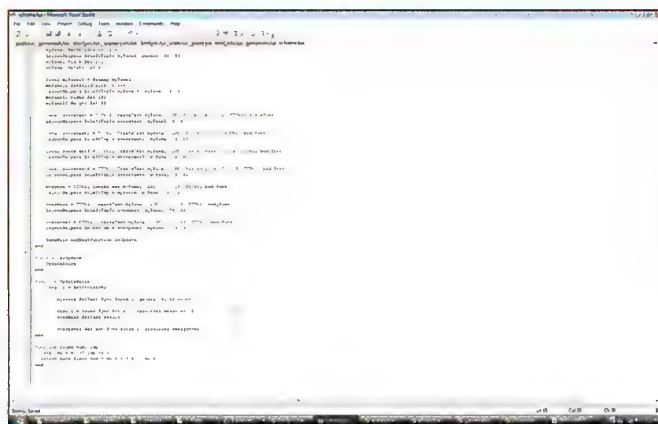
import command to create our frame with the map group assigned, literally, as its parent.

You'll notice that we reference a file inside our mod called 'scframe.lua'. If you're extremely observant you might realise that this file doesn't exist. Don't worry, that's our next stop.



Chris Taylor on offensive strategies

'People always over-fortify the front of their base and leave their rear wide open. What I do is go for gunships and I sneak them right around the edge of the map way outside the range of their anti-aircraft. I come in the back door and rip up their economy.'



▲ Thanks to Visual Studio for providing a great modding environment. Notepad++ and Crimson Edit are both viable alternatives.

Framed!

In the same directory as our hooked gamemain.lua, create the file 'scframe.lua'. This is where all the code for our status report panel will reside. Open the file and at the top, write:

```
local Bitmap = import('/lua/modules/maui/bitmap.lua').Bitmap
local LayoutHelpers = import('/lua/modules/maui/layouthelpers.lua')
local UIUtil = import('/lua/modules/ui/uiutil.lua')
local GameMain = import('/lua/modules/ui/game/gamemain.lua')
```

These are our imported function libraries, which we'll use to create the nuts and bolts of our status panel. If you'd like to check out all the modules available for importing, many are stored in 'lua/modules/maui' and 'lua/modules/ui', so be sure to go through the directory structure of the lua.scd file we decompressed earlier.

Next, we define the local variables we're going to use in multiple functions of our scframe.lua script:

```
local myscore = false
local overpower = false
local overmass = false
```

These variables will be local to scframe.lua, but the scope of them does not go outside of our script. This way, we can access them wherever we are in our panel code, but they won't interfere with any other scripts in the game.

Now to write the 'CreatePanel' function we called in our hooked gamemain.lua:




```
function CreatePanel(parent)
and
```

Okay, that wasn't so hard. But now we have to create our panel. So, inside of this function write:

```
local myPanel = Bitmap(parent)
myPanel:SetSolidColor("gray")
LayoutHelpers.AtLeftTopIn(myPanel, parent, 35,
35)
myPanel.Width:Set(200)
myPanel.Height:Set(60)

local myPanel2 = Bitmap(myPanel)
myPanel2:SetSolidColor("black")
LayoutHelpers.AtLeftTopIn(myPanel2, myPanel, 4,
4)
myPanel2.Width:Set(192)
myPanel2.Height:Set(52)
```

What we've done here is create two panels – this is purely for aesthetic reasons. The first panel will serve as the background while the second will have all our status info. Each panel is created by making a variable (myPanel) that inherits the Bitmap class. With this done, myPanel gains settings such as colour, width and height. We use the LayoutHelpers class to take the work out of positioning the panel. Using the AtLeftTopIn function – just look inside 'lua/modules/maui/layouthelpers.lua' for more such functions – we align the panel from the top left corner of its parent, the map group control. With the panels sorted, we need to place text on them:

```
local title = UIUtil.CreateText(myPanel,
LOC("ScoreTime"), 12, UIUtil.titleFont)
LayoutHelpers.AtLeftTopIn(title, myPanel, 4, 4)

local kills = UIUtil.CreateText(myPanel,
LOC("Kills:"), 10, UIUtil.bodyFont)
LayoutHelpers.AtLeftTopIn(kills, myPanel, 4, 20)

local mass = UIUtil.CreateText(myPanel,
LOC("Wasted mass:"), 10, UIUtil.bodyFont)
LayoutHelpers.AtLeftTopIn(mass, myPanel, 4, 32)
```



▲ Supreme Commander is one of a new breed of games embracing community modding.

THE KITCHEN SYNC?

Supreme Commander's Lua execution areas are split in three – the 'front end' for the main menu and its sub menus; the 'sim' for the game itself; and the 'ui', the in-game user interface. Lua scripts run in one area are isolated from those in another, meaning getting information from the game (the sim) to the UI (the interface) and vice versa cannot be done directly.

Instead, we have SimSync.lua and UserSync.lua. These files update a table, called Sync, during each game 'tick'. Data stored in the Sync table (shared between these files) can be accessed by both the sim and the UI. You're free to shove your own data into these tables for whatever purpose.

```
local power = UIUtil.CreateText(myPanel,
LOC("Wasted power:"), 10, UIUtil.bodyFont)
LayoutHelpers.AtLeftTopIn(power, myPanel, 4, 42)
```

Using the UIUtil class, we create text boxes attached to our panel so that if we every want to move it, all we need to do is just move the original myPanel and everything else will follow. UIUtil contains all the default font assignments in the game as well, so open up this script if you want to hunt down more. Again, LayoutHelpers makes a return to align our text.

The above text boxes however are all static and simply labels. It'll take the following code to give them some purpose:

```
myscore = UIUtil.CreateText(myPanel, LOC("0"),
10, UIUtil.bodyFont)
LayoutHelpers.AtLeftTopIn(myscore, myPanel, 30,
20)

overmass = UIUtil.CreateText(myPanel, LOC("0"),
10, UIUtil.bodyFont)
LayoutHelpers.AtLeftTopIn(overmass, myPanel, 70,
32)

overpower = UIUtil.CreateText(myPanel, LOC("0"),
10, UIUtil.bodyFont)
LayoutHelpers.AtLeftTopIn(overpower, myPanel,
74, 42)
```

We don't need to use 'local' in front of these variables as we've already defined them outside of the function. All we need to do is assign text boxes to them and sort their position out on the panels.

All we need to do now is make sure our status info is updated on a regular basis:

```
GameMain.AddBeatFunction(scUpdate)
```

Inside the original gamemain.lua is a neat function called AddBeatFunction, as you can see here. This function makes it incredibly easy to set up a routine to be called each game tick. This makes certain that our status info will be current.

Keeping up-to-date

With the CreatePanel function done, we move on to the update code. In our scframe.lua script, append the following function to the bottom of the file:

```
function scUpdate()
UpdateScore()
end
```




▲ It's not huge, but it's a start. Feel free to make modifications and add your own info.

You're probably asking yourself 'What the hell?' As you should – this function by itself does nothing at all. We need to create the UpdateScore function so something actually happens each game tick. Below the 'end' of scUpdate, type the following:

```
function UpdateScore()
    local i = GetFocusArmy()

    myscore:SetText(Sync.Score[i].general.kills.
count)

    result = round(Sync.Score[i].resources.
massover, 2)
    overmass:SetText(result)

    overpower:SetText(Sync.Score[i].resources.
energyover)
end
```

Here's the meat of our project. Firstly, we grab the 'army index' of the current player's army.

The game stores each player and his entire army in a table and each player is given an ID, which represents their position in this table. Using the globally accessible 'GetFocusArmy' function, we can grab this ID. For our purposes, we've stored it in a local variable called 'i'.

With our text boxes assigned for easy reference to a variable, we can directly set their text using the 'SetText' function, inherited via CreateText. To grab the relevant info, refer to the Sync table (see boxout 'The kitchen sync?') and hit up the Score table stored within. Then it's just a matter of setting the text for each text box. For a list of all the score data available in the Score table, check out scoreaccum.lua in our decompressed lua.scd folder.

We're almost finished. If you were to run this now, you'd find that the overmass value is far too long – it has about 10 or so decimals places and that's completely irrelevant for our purposes. To shave this down to two decimal places, we have to write our own rounding function – Lua doesn't have one natively. So, at the bottom of scframe.lua add:

```
function round(num, idp)
    local mult = 10^(idp or 0)
    return math.floor(num * mult + 0.5) / mult
end
```

Essentially this function takes the number and the number of desired decimal places (idp). We then multiply idp by the power of 10 to get the most significant numbers. We then truncate the new value, and multiply it by our number of decimal places to get our final figure. Our thanks to lau-users.org for this nifty routine.



Chris Taylor on economy 'I do believe in a power economy. Once I have a super-powerful economy, I can really slap down some death wherever I choose.'

The end result

Now save your work and start Supreme Commander via sc.bat. Once inside the game, head over to the Extras -> Mod Manager and activate the 'ScoreTime' mod. Start up a skirmish map and up in the top-left hand corner you'll see a small panel that displays your total kills, and the amount of mass and energy that has gone to waste during the game, which should help you tweak your construction efficiency.

If anything goes wrong, you don't have to quit and restart the game to make changes in your mod live. Just edit the code, go into the game and bring up the console with the 'tilde' key.

In the console type:

```
Lua RestartSession()
```

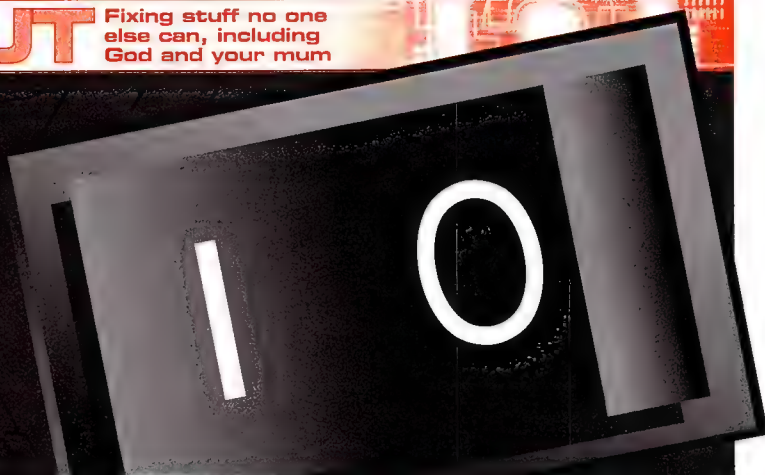
This will reload your scripts and when the game restarts, the changes will be effective immediately. Also, don't forget to hit F9 to debug your code! 

INPUT OUTPUT

Fixing stuff no one else can, including God and your mum

Dan's cans

Daniel Rutter awaits you and your tech dilemmas at io@atomicmpc.com.au. Not physically, of course, probably the mail server actually.



Never rule out goblins

Since early December, my PC has been suddenly blacking out and restarting itself. It doesn't give me any warnings, but sometimes I get a static noise or a beep through my speakers as it happens.

It generally occurs when the PC is under load. Also, it seems to occur more frequently during the day and – this may sound strange – even more frequently when the weather's warm. Windows Memory Diagnostic showed up clean, plus my box is well ventilated with plenty of fans and is not choking on dust.

I remember hearing somewhere that in times of peak electricity usage such as hot days the power grid can have trouble coping with

demand and as a result, drops a few volts. Could this – along with my PSU being nearly two years old – be contributing to the problems I'm having? Would a new PSU help?

Antony M

Yes, it is possible that your PSU is at fault. There's no limit to the weirdness that can be caused by a faulty power supply.

The symptoms you're reporting point in a different direction, though.

There's actually, you see, nothing even *slightly* strange about a computer that dies when it's warm. The usual cause, once you've eliminated vast fields of gently waving dust, is a bad CPU or motherboard-chip cooler.

I/OOTM wins a Logitech G5!

If Dan thinks you're the best, he'll pick you to get this mouse. That's all it takes, honest.



All modern PCs can pretty much sound an alarm when the CPU temperature exceeds X degrees, or when the CPU fan speed drops below X rpm. But the alarms are often turned off in the BIOS setup, if only to avoid novice users freaking out when they plug the CPU fan into a different header.

I/O OF THE MONTH

Square card, round case

In the 'Extreme' category of your Atomic Kitlog section you list the Lian Li PC-S80 case and GeForce 8800GTX graphics cards. I was very interested in building this PC, but several online sources say the Lian Li case can't accommodate the 8800s. My question is why?

Patrick Balzan

Yep, you're right. The motherboard area of the S80 is just barely – only a few millimetres – too small to fit the 26.7cm length of a standard 8800GTX PCB. The drive bays are a hair too close to the back of the case.

Here's a thread about this, including neat-o pictures with a ruler: tinyurl.com/2x4w9p

It's possible to get around this by moving the drive cage a bit. It's riveted in place, but you could drill out the six aluminium pop rivets, make four new holes to shift the drives a little closer to the cooling fans – or extend the existing holes into slots – and bolt or rivet them back in place. That'd probably do it.

Or you could do it the nastier way and just chop out the aluminium side of the drive cage where it lines up with the card. You might end up having to reinforce what was left, though.

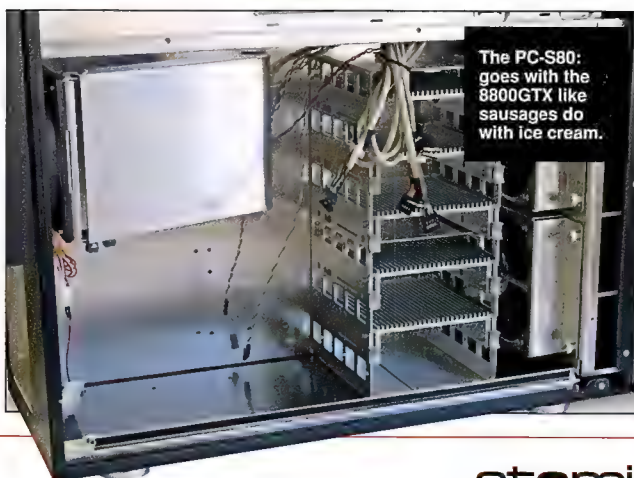
None of this is really worth doing if you don't have an S80 already, of course. Get some other case.

Any ordinary tower case with no drive bays in front of the motherboard slot area should be able to accept big cards, but there are still many cases that can't. This is because normal home and office users have, historically, almost never *used* big cards, so it's pretty safe

for case manufacturers to put extra 3.5" bays or something else in that space instead.

The sudden – relative – popularity of the 8800GTX has brought this to people's attention. Including the Kitlog editors, who have now, ahem, revised the hardware configuration for the Extreme system, and set about hiring civilian contractors to dispose of anybody who remembers their error.

The 8800GTX isn't, actually, *that* huge. Full-length PCI cards can have PCBs up to 312mm long (www.interfacebus.com/PCI_Card_Dimensions.html), and full-length ISA cards, back in the mists of time, were even longer.



You can easily check CPU temperature in Windows with a variety of software. The kids are mostly using SpeedFan these days, and that will give you an idea of how hot your CPU is. The maximum junction temperature for modern CPUs can be up around boiling point, however, even those processors can be expected to get flaky when their temperature sensor reports more than 80°C.

If the CPU's cool, a motherboard chip cooler, or possibly even a graphics card cooler may be the culprit.

Cooler performance deteriorates if the heatsink is full of dust – which isn't necessarily easy to see – or if the fan is on the way out, or if the thermal interface material between the heatsink and the chip is drying out or otherwise compromised.

Most CPU coolers use common, easy-to-replace fan types, and small chip cooler fans can be replaced with larger ones lashed up somehow to blow on the now-fanless heatsink. You can replace bad thermal material by removing the cooler, scraping off the old stuff, and replacing it with a smear of ordinary cheap white thermal grease.

Yes, there are ten thousand exotic thermal goop formulations out there, but the cheap white stuff is within a few percentage points of all of them. Slightly more expensive silicone-based white stuff will resist drying out for longer.

Wanted: 5GHz Northwood

I I'm running XP Pro SP2, using a 2.8GHz Socket 478 P4 with 512KB cache (800MHz), plugged into a Gigabyte GA-8IPE1000 Pro2 with 1.5GB of Kingston dual channel DDR400 RAM. Very soon I want to upgrade my PATA hard disk drives to twin 320GB SATA Seagate Barracudas, because I'm getting into some (legitimate!) DVD replication. I've also optimised with latest BIOS, drivers, patches, etc.

My question: What's the fastest Intel CPU I can put in this motherboard?

Peter Greening

O You can't get anything that'll be a whole lot faster than what you already have.

The 800MHz-bus 3.4GHz P4 Extreme Edition is the fastest-at-stock-speed Socket 478 chip that will ever exist. But there are 3.2GHz and 3.4GHz Prescott and Northwood-core P4s as well. I'd have one of those, personally.

The Extreme Edition has the weird 'Gallatin' core with Level 3 cache, which can make it – just – perceptibly faster for some tasks than an equivalently clocked Northwood or Prescott. The difference at a given clock speed really isn't noticeable for most purposes, though, and the plain Northwood core runs considerably cooler. Northwoods are also more overclockable than Prescotts and Gallatins, all things being equal, but you shouldn't expect much overclocking headroom from any P4 with a sticker speed above 3GHz. Well, not without heroic cooling,

anyway – yes, I know about those nuts who got a P4 up to 8GHz with liquid nitrogen.

If your existing 2.8GHz chip has 512KB L2 cache, as you say, then it's a Northwood and should be quite happy running at 3.2GHz or something. Then, there'll be bugger all difference between it and any new Socket 478 CPU you care to name. Even at stock speed, your 2.8GHz Northwood will get better than 0.7 times the benchmark results of a 3.4GHz Extreme Edition chip for most tests. Seeing as the 3.4GHz EE is still selling for about \$1000 as I write this, I doubt you're too attracted by that prospect.

If you had an old 2GHz-or-worse CPU then upgrading to 3GHz-or-better could give you a real performance boost. 3GHz-ish Northwoods are still widely available, and very good value.

However, there's just not much more than that to be had.

Not as I337 as he sounds

I I hav3 a k3yboard that has on3 k3y that do3sn't want to work.

Gu3ss which k3y.

I'm d3finit3ly sur3 that it's not contacting th3 part und3rn3ath corr3ctly. Is th3r3 an 3asy way to fix this?

I don't want to buy anoth3r k3yboard b3caus3 I had 3nough troubl3 finding a g3n3ric USB k3yboard that's silv3r/black. I'm r3moving th3 markings from 3ach of th3 k3ys so I can hav3 my own Das K3yboard.

Morris Umali

O It depends on the keyboard, and also on your definition of 'easy'.

Most keyboards today are of the rubber dome type. In the simplest and cheapest

version, as seen in remote controls, the plastic key pushes down a rubber dome, on the underside of which is a rubber peg with a conductive coating, which bridges traces on a plastic membrane to make the contact.

When this sort of keyboard goes bad – as it often does in remote controls – you can fix it by re-coating the bottom of the offending key's contact with a conductive substance, like glued-on aluminium foil. Just scribbling on the peg with a lead pencil is often good enough.

The most common keyboard design today is the improved 'dome membrane' type, which is a hybrid of the basic rubber dome and the 'membrane' keyboard, as seen on the Sinclair ZX81 and microwave ovens.

In dome membrane keyboards, the dome bends a top membrane, through a hole in a spacer, onto a bottom membrane. When traces on one membrane touch traces on the other, you get your keypress.

The two membranes and the spacer are each on a separate sheet of plastic, and you can remove and replace them quite easily once you've found all the screws that hold the keyboard together. Flop out the membranes, wipe down the contact faces with a damp cloth, then check for any remaining crud and damage on the contacts for the offending key(s).

The best way to avoid millions of key-parts cascading onto the floor, by the way, is to think carefully about which way up you should hold the keyboard for each stage of the operation. It's seldom a good idea to turn the keyboard right-side up again until you've finished reassembling it.

Take this apart...



...and don't sneeze on this.



ATOMIC HOTBOX

The best reader-submitted custom-made boxes every month

HOTBOX

Welcome to Hotbox, where each month we give the best case mod an awesome prize! Want to win? Submit your box now!



JC's Drum Box

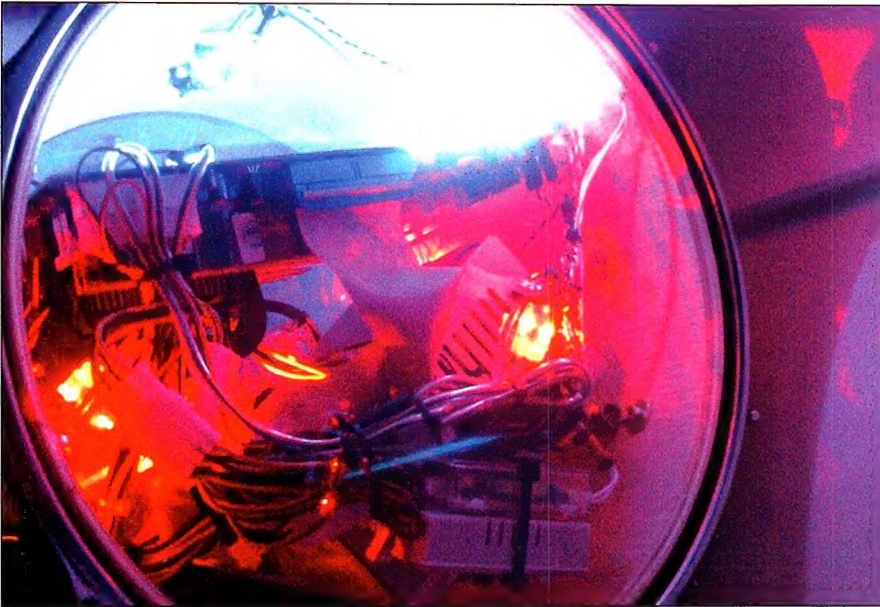
After investigating popular mod designs from old issues of *Atomic* and on the Net, I decided that the shoe box and briefcase thing was all too common these days. I wanted to do something different for my Linux box. Being a drummer, I have a few drum kits, and just happened to have an unused tom-tom lying around. At first it seemed pretty crazy, but the more I thought about it, the more appealing the idea became.

I had some doubts about ventilation and safety issues, but the fact that I live with an engineer and an electrician came in handy. I didn't want to damage the shell of the drum too much, if at all, in case I wanted to use it in the future, so I had to keep this in mind during the process.



Fame, fortune and free stuff can be yours! Send your Hotbox to **hotbox@atomicmpc.com.au** and make sure you include the following details so you can be eligible:

- ▶ 6-12 high resolution, well-lit, pictures of the inside and outside of your case
- ▶ A 500-word description of how you made it, the obstacles you overcame, the tools you used, and your inspiration
- ▶ A detailed list of the machine's specs. Include CPU, video card and RAM.



I took both skins off and unscrewed all of the lugs from the shell – the lugs are the metal mounts around the side of the shell which allow the skins to be attached. I installed a loop of coated wire at each lug point and then screwed them back in. The aim of the game was basically to have all the components levitating within the shell. First I installed the motherboard, which I attached to the wires with zip ties. Then I installed the hard drive and PSU, and cut a hole in the skin for the power and Ethernet cables.

After running the machine for a while I realised the ambient temperature was about 55°C – not too good. So I installed a few old 80mm fans that I had in the top skin, which brought the ambient temperature down to a comfortable 44°C. The fan grills were an added afterthought. I decided it needed some colour, so I added a blue neon, and about nine red LEDs.

Sweet, all finished! The motherboard and lights were the only components I had to buy. I had everything else lying around. So it only cost about \$150 to put together. Now whenever someone enters the house they stop, look up and say, 'What the hell is that?!?!' He he. It's pretty cool.

And there's no need to turn lights on at night – that neon lights up the whole room!



technical details

CPU

Pentium 4 1.6GHz (Socket 478)

MOTHERBOARD

Asrock P4i65G

VIDEO

Onboard Intel 865G chipset

RAM

1GB DDR400 PC3200 Kingston

OS

Gentoo Linux

Hotbox of the month wins a Gigabyte GA-965P-DQ6!

- Intel Core 2 Extreme/Core 2 Duo/Pentium D
- 8-channel Dolby and DTS
- Quiet 0dB cooling design
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- All-solid capacitors

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TECHNOLOGY



FALLOUT

Funnies and humour from the fallout zone

Enter the Zoe

Logan Booker tries to understand a world that hates him.



So, I can just run around in circles and shoot at them?

'Yes. No wait. *Backwards. Backwards* the circle must be.'

My eight-second crash course in fighting mutant dogs was complete, as was my first lesson in the 'Zoe'. Originally I had thought it was a simple typo on the entry sign, but Gunter, my burly Russian mentor, had informed me otherwise.

'No, right it is. It be,' he had offered in stunted clarification. If God had placed Kiev's top female wrestler in a breeding pen with some sort of S&M-loving version of Yoda, Gunter would have been the result.

'Ready you are for the Zoe, says Gunter,' said Gunter, eliminating the need for me to narrate the sentence at all.

And so, in I went.

Admittedly the Zoe wasn't as *depressing* as I thought it would be. It was however exactly as *distressing* as I thought it would be.

I had just encountered a group of 'gawkers', the Zoe's mercenary-like inhabitants. The three I'd just run into were all clothed in the same drab beige jackets and blue jeans. I could only surmise that it'd been a while since these guys had gone out for a night on the town, which probably had something to do with the fact that the closest town was irradiated with caesium-137.

Surprisingly, this wasn't what distressed me. I tentatively pointed at the barrel of fire my newly-found comrades were huddled around.

'Uh, is someone going to do something?'

'About what?' grunted the one nearest to me.

'I hate to be the one to break the news to you guys, but, er, there's a man, on fire, in that barrel.'

Like a ragdoll tormented by a deranged computer game physics system, the body of a gawker – still wearing his beige jacket and blue jeans – twitched uncontrollably in the flames. It was the most appalling sight I'd ever seen, short of the reflection of my own naked body.

'Oh, Tobius. Think he fell in about a week ago,' one of them quipped. Shock raced to my brain,

“Like a ragdoll tormented by a deranged physics system, the body twitched in the flames.”

beating suspension of disbelief by half a leg. It was then I made another startling discovery.

'Is that... is that a pistol in his pocket?'

'No, he's just happy to see you!' They all laughed. I contemplated escape.

But first I'd try reason.

'Now bear with me here folks... do you think it might be a good idea to pull poor Tobius out of that barrel and give him a decent burial? Or, at the very least, do something about that gun before the heat makes it go off?'

'Like milk?'

'What?'

'Milk goes off in the heat. Had a can of it yesterday sitting in the fridge. Blasted thing died on me. Opened the can today, it was off like a horse at a glue factory.'

'Oh, now see! You're bright enough to use a simile yet *not* realise there's a man burning in a fire right in front of you?'

All I received was a confused stare. Well, three confused stares, which compounded into one, giant glare of incomprehension.

'What Tobius?'

'Yes.'

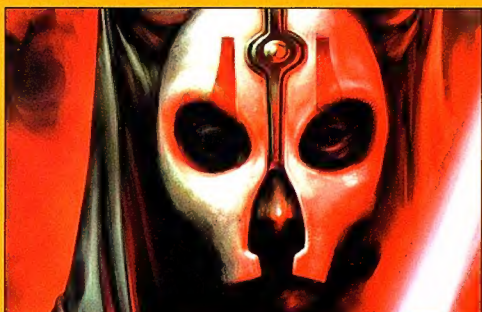
'On fire?'

'Yes!'

'Oh, he didn't die in the fire. He forgot to run backwards in circles and a mutant dog got him.'

And that's how I learnt my first lesson of life in the Zoe. Again.

NEXT MONTH



HISTORY OF ROLE-PLAYING GAMES

Alexander Gambotto-Burke goes behind the scenes of the games industry to uncover the gory details of the RPG developer. Hard hitting and informative? You betcha.

CASE PAINTING 101

Ron Prouse goes back to basics with this tutorial on slapping a coat on your case. Not a fur one mind you, the acrylic or water-based kind.

VIDEO CODEC SUPER TEST

Which codec is best for you? David Field encodes the crap out of a few movies to bring you the startling, and less than startling results. DivX, Xvid and more compared!

OPTIMISE LINUX FOR DUAL-CORE!

Upgraded to a multi-core processor recently and looking to get a bit more from Linux? Leigh Dyer delivers the goods with this in-depth tutorial.

Mesmerizing 3D Graphics for True Gamers

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